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Table of Contents.

[The Whole of the Literary Matter in THE MEDICAL JOURNAL OF AUSTRALIA is Copyright.]

ORIGINAL ARTICLES— Page.
Use and Abuse of Local Antiseptics on Wounds, by B. K. Rank .. 629
An Investigation of the Hæmatocrit and a Suggested Method for the Standardization of Hæmatocrit Readings, by D. J. Monk Adams .. 636

REPORTS OF CASES—
Uncinate Epilepsy: The Subjective Symptoms of an Attack, by K. B. Noad .. 641

REVIEWS—
Practical Anæsthesia .. 641
Care of the Mother during Pregnancy and after Delivery .. 642
Midwifery for Nurses .. 642

LEADING ARTICLES—
A Queensland Inquiry on Sexual Offences .. 643

CURRENT COMMENT—
The Serum Salicylate Content in Acute Rheumatism 645

ABSTRACTS FROM MEDICAL LITERATURE— Page.
Bacteriology and Immunology .. 646
Hygiene .. 647

BRITISH MEDICAL ASSOCIATION NEWS—
Medico-Political .. 648

NATIONAL EMERGENCY MEASURES—
Medical Equipment .. 648

CORRESPONDENCE—
"English as She is Writ" .. 649

OBITUARY—
John Lockhart Gibson .. 649

NAVAL, MILITARY AND AIR FORCE—
Appointments .. 651

NOMINATIONS AND ELECTIONS .. 652

BOOKS RECEIVED .. 652

DIARY FOR THE MONTH .. 652

MEDICAL APPOINTMENTS: IMPORTANT NOTICE .. 652

EDITORIAL NOTICES .. 652

USE AND ABUSE OF LOCAL ANTISEPTICS ON WOUNDS.

By B. K. RANK,
Major, Australian Army Medical Corps.

(From a Facio-Maxillary Plastic Unit, Australia.)

REPUTATIONS of new antiseptics provoke condemnations of the old. With progress, this must be. If, however, we examine the reasons for the failures and consider the limitations of the older drugs, we may well prevent some failures of the new. These will not all be due to the nature of the antiseptic, but some will be due to the manner in which we apply it, and here we can fail with a new drug often for the same reasons that we failed with its predecessors. That thought is the concept of this communication.

No antiseptic heals a wound, though it may well eliminate wound sepsis, the common cause of delayed healing. So frequent is sepsis of open wounds, that we are apt to accept common standards of wound healing and forget that unhampered, rapid wound healing is the normal process. In this regard we think that some application to the wound—some wonder-substance which eradicates or controls sepsis—may in itself effect healing.

To evaluate the rational application of antiseptics, old or recent, is difficulty itself. There is ample scope for the sceptic as for the gullible enthusiast. There is the difference of a world between interpretations of the worker *in vitro* and those of the clinician *in vivo*, as indeed between the behaviour of the same drugs and organisms under their respective eyes. This is exemplified by the sulphonamides, which *in vitro* are relatively poor antiseptics, but which in practice have achieved an unprecedented development in chemotherapy—and, moreover, have effected a reaction in our attitude towards such substances which must not be forgotten.

The acid test for an antiseptic must always be its clinical application, and here, unfortunately, we come against the interpretation of an individual surgeon—a personal factor. Each has his own standard based on his own experience with the nature and behaviour of wound healing. Such standards seldom bear comparison. Add to this the multitudinous types and variations of wounds and conditions, and there is some idea of our present quandary. It is indeed regrettable that with all the wounds of war, and with the undoubted advantages of service administration and control—what shall and shall not be done—we still have no established clinical evidence one way or another, no conviction of the true effect of these drugs, whether in the prevention or in the control of wound infection. In "The 1943 Year Book of Surgery"[1] the work of a National Research Council is quoted, and is regarded by the editor as the best controlled investigation with the most conclusive evidence yet available in this direction. He summarized the position thus: "Sulphonamides do not lessen the incidence of local infection." The article states, however, that sulphonamides minimize the general spread of infection and cut down the incidence of septicæmia and death. It is stated that this controlled investigation in eight separate clinics covers a series of accidental wounds, fractures and burns in civilian patients, simulating war wounds. From those who have seen and studied the nature of wounds in modern warfare, we ask, where is their counterpart in civilian life, and where is the necessity for their management under extraneous conditions similar to those of active service? Most of the mistakes have arisen in the surgery of this war by transposing civilian surgical ritual to the management of war wounds.

Unscientific though it may be, we must admit that the only valuable assessment of an antiseptic must be in the intrinsic experience of individual surgeons, which should be controlled by as many cold records as are of practical value, such as those of bacteriological progress, healing time and results. It is as a contribution on that basis that this paper is offered.

For the past five years, in units such as the one to which I am attached, there have been opportunities of handling

many surface wounds of a type which lend themselves to the study of local antiseptics. This period commenced at a time when the value of general chemotherapy in certain infections was established, its rationale still unknown. Working on this type of wound with sulphanilamide, Colebrook—as a bacteriologist working with surgeons—pioneered a union of effort of which surgery has long been in need. He demonstrated the use and possibilities of the sulphonamides as local antiseptics,[3] which had repercussions in results obtained. With full realization of the importance of preventing infection and cross-infection in wounds of a surface type, so prone to such infection by their routine handling and observation, and with the realization also of the importance of controlling even one type of wound infection (hæmolytic streptococcal infection) on surface wounds where plastic procedures were planned, a conscientious and active effort has been made in this unit, despite varying localities and conditions, to prevent and eliminate sepsis from such wounds. To this end, the possibilities of the local antiseptics available have been carefully explored; but an antiseptic is regarded only as a surgical weapon, to be used with—and in respect to—all the established surgical principles of treating injuries and the injured. The standard of success is unretarded, natural healing or elimination of sepsis to a degree compatible with safe surgical wound closure by one of the available methods of suture, graft or their various combinations, which may entail extensive local operations and rearrangements.

On this common background of approach, certain rules can be made concerning the application of local antiseptics. Outside these rules, their good effects are nullified, and correct interpretations regarding their true use are jeopardized. Discrimination in the use of local antiseptics is essential. This involves three considerations: (i) the wound must be suitable for local antiseptics; (ii) the correct antiseptic must be used; (iii) the antiseptic must be used according to the correct method.

Wounds Suitable for Local Antiseptics.

Much hinges on the term "local". Antiseptics are employed locally to obtain an effective concentration of a drug for an effective period on the wound surface. On an infected granulating wound surface, the concentration of some drugs obtained by local administration may be many times that achieved in the blood by general administration, as with sulphanilamide, for example, but that concentration is strictly limited to the surface. Though there is little absorption from a granulating surface, there may be absorption to produce a dangerous blood level from a recently rawed surface with its vascular reaction. Such absorption may prove dangerous from a huge recent surface wound or burn, as, too, may the absorption from it of bacterial toxins.

There are four requisites of a wound if it is to be suitable for treatment by the local application of antiseptics.

1. There must be no spreading tissue infection in relation to the wound. From a concentration of the drug in a wound surface, there is little penetration which can influence a spread of tissue infection from that wound.[3] Even if this is associated with a surface infection, local antiseptics are quite inadequate *per se*. Treatment with an appropriate drug to obtain an effective blood level is indicated.

2. The whole of the wound must be accessible to the drug. It is of no value to apply an antiseptic to one part of a wound, leaving it open to repeated reinfection from another part of the wound inaccessible to the antiseptic. Only certain types of wounds, therefore, are true candidates for local antiseptics, and it is recognized that these constitute an abnormally large proportion of the wounds seen in a unit of this type. Wounds, inaccessible to antiseptics by one method—sprayed powder, for example—may be amenable to other methods of application. Certain sinuses, cavities and culs-de-sac may be reached by fluid antiseptics, suitably given.

3. There should be no focus of repeated reinfection of the wound surface. Failure of a given local antiseptic on an apparently suitable wound and in the presence of an appropriate infecting organism is always a sound cause for a clinical check-up of the wound and our handling of it. Is it being subjected to repeated reinfection? Frequently this has been shown to be due to previously unrecognized or disregarded retained foreign bodies or to bone sepsis. When active bone sepsis or soft tissue sloughing is established, the local application of sulphonamides, for example, is not only of no value—it may actually delay sequestration or the sloughing processes. Persistent application, moreover, may occasionally produce a strain of organisms resistant to the antiseptic. This seems to be common to all antiseptics, and the old idea of "ringing the changes" of antiseptics has a reason, for bacterial resistance to an antiseptic may not only develop, but may be perpetuated by a strain of organisms. James Syme,[4] in 1856, discussing various metallic solutions, the antiseptics then in vogue, wrote: "These lotions, or washes, as they are called, ought to be varied occasionally, as habit lessens their effect." Production of a drug-resistant strain by persistent use of an antiseptic over a long period on an unsuitable wound is bad practice, for it is making an infection difficult to eradicate at the appropriate time when the wound is suitable for the local application of antiseptics, or when secondary surgical procedures are indicated that would make it so—for example, sequestrectomies, preparation of bone cavities *et cetera*.

4. The bacteria of the wound must be known. Some organisms may have grossly perceptible properties, but the surgeon who smells the nature of a wound infection or diagnoses it by a glance, or who does not have a cultural examination made of a surface swabbing from the wounds he is treating, is in the same category as one who never takes X-ray films of the fractures he is treating. Only on a knowledge of the infecting organisms can the correct antiseptic always be chosen from the whole gamut available.

The Choice of the Correct Antiseptic.

The choice of the correct antiseptic depends on the infecting organisms and the antibacterial properties of the antiseptics available. It seems that the peculiar property of Gram-positiveness renders an organism most vulnerable to the antiseptics now in use—sulphonamides, acridines or penicillin. Sulphanilamide used locally is effective against most common strains of hæmolytic streptococci, but against no other of the common pyogenic organisms. It should be used if—and only if—streptococcal infection is present. We hear often that sulphanilamide is "no good for tropical ulcers". On the contrary, infective ulcers, in which the predominant organism is the hæmolytic streptococcus, heal extremely well if sulphanilamide is correctly applied. When the streptococcus is eliminated, the stage of skin maceration and spread of the ulcer gives place to one of epithelial activity, and, moreover, to a condition compatible with effective skin grafting for any ulcer of size. Just what proportion of tropical ulcers are of this nature is another matter. In the Middle East, most of the so-called "desert sores" were none other than acute spreading sores of this nature. Over 90% of them could well be regarded as streptococcal infections of minor bites and abrasions. When and as these ulcers healed, disappearance of the streptococcus from surface swabbings was always noteworthy. Captain O. Alpins reported in this journal, under the heading "Pyoderma Ulcerosum Tropicalum", his experience with 300 of these lesions in the Northern Territory. His description tallies well with those we saw in the Middle East. His thorough investigation of their ætiology confirms the belief that, though the subjects usually had lowered general local resistance, or both, the lesions were primarily infective in origin and the organism responsible was the hæmolytic streptococcus, the staphylococcus being a secondary invader. What is the original nature of other "tropical sores" or "jungle ulcers" arising in the New Guinea areas, we do not know. They may not be primary streptococcal infections, in which case they would not respond to sulphanilamide treatment, nor could sulphanilamide be intelligently used on them.

The Correct Method of Using the Antiseptic.

The correctly chosen antiseptic for a particular infection on a wound suitable for local treatment may still fail horribly if incorrectly applied. This is a common cause of disrepute and of failures attributed to sulphanilamide. Any routine or technique of using an antiseptic must ensure an effective local concentration for a sufficiently long period. This is because of the bacteriostatic as opposed to the bactericidal nature of most recent antiseptic agents. The rational method of best attaining this concentration for a sufficiently long period must vary with the drug, and with its physical, chemical and bacteriostatic properties, and, moreover, with the insuperable factor of its availability and supply to any surgeon. These requirements are best considered in relation to some of these drugs now in common use.

Sulphonamides.

The properties of the sulphonamides which dictate their method of use are their solid and partially soluble nature, with which varies inversely their persistence or lasting effectiveness in a wound. Sulphanilamide is the most soluble and gives the best local concentration, but it is more evanescent in its effect than sulphathiazole, which, being less soluble, is more persistent. The relative insolubility of sulphapyridine renders it worthless as a local antiseptic (see Table I).

TABLE I.
(*After* Hawking.[3])

Antiseptic.	Solubility in Serum, 36°.	Persistence on Wound.
Sulphanilamide	1,500 milligrammes per 100 cubic centimetres.	Less than twenty-four hours.
Sulphathiazole	184 milligrammes per 100 cubic centimetres.	Four to five days.
Sulphapyridine	61 milligrammes per 100 cubic centimetres.	Seven to ten days.

Sulphadiazine is not mentioned, as at this unit we have had no experience of its local use or usefulness—which is of relatively high repute. Combining the advantages of solubility and persistence, a mixture of sulphanilamide and sulphathiazole, two parts to one, may well be considered for local application. Sulphathiazole has been held to have some effect on localized staphylococcal infections, although we have never succeeded in eliminating staphylococci from surface infections in the same way as we usually achieve elimination of a streptococcal infection with sulphanilamide. Indeed, the staphylococcus seems a much less vulnerable organism to antiseptics in general, and moreover, it is always more ready to recrudesce.

We know also that the effect of sulphanilamide can be nullified by large amounts of para-aminobenzoic acid present with degeneration of tissue and in pus.[6]

The correct use of sulphanilamide, therefore, must respect these facts by the technique used. Hence the importance of the following requisites. (i) Application of the powder directly to a cleaned wound surface, not on a wound swimming with pus. Wounds should always be cleaned with saline solution each day as a preliminary to being dressed with sulphanilamide. We commonly use local or general saline baths and spray the powder on the wet surface. This is important, whether the antiseptic is inhibited by pus or not, for direct local contact of an effective concentration is still important; and pus accumulation can prevent this. (ii) Even distribution over the whole wound surface. A sulphanilamide-sulphathiazole mixture finely powdered and sterilized[1] is most evenly dispersed over the whole wound by a powder insufflator. A "hoar frost" distribution gives a concentration about 0·05 gramme per square inch. Large amounts, such as are often applied by dusting or sprinkling, are unnecessary. (iii) A damp over-all dressing. After the powder spray, a damp outer dressing over a layer of large open-meshed "Vaseline" gauze (*tulle gras*) is advised. Moisture is helpful for effective solution of the drug and for its local dissemination on the wound surface.

We have often seen surface wounds and ulcers smothered with "Vaseline" or inspissated exudate still in a characteristically unhealthy state, and still producing surface swabbings from which hæmolytic streptococci are grown on culture, after so-called "sulphanilamide treatment" for weeks; sulphanilamide itself is sometimes mass-caked about such areas, but is not truly in local contact with the wound. Continuing with the same antiseptic, but satisfying the desiderata of a cleaned surface and direct contact distribution, we have often noticed clearance of streptococci from such wounds in a few days, to the benefit of their healing, and with a less amount of drug than was used at any one of their previous "sousings". The finer details of effective dressing are points of nursing, maybe; but we must see that our staff know them and note that they are carried out to the letter N. Without these details, treatment is often a waste.

Concerning the local use of sulphanilamide for surface streptococcal infection, two general observations are noteworthy, for they apply to most antiseptics. The first is rapidity of effect. In the majority of cases in which sulphanilamide is used on appropriate wounds, the streptococcal infection is eliminated in a short time, three to seven days. This is so much so that if routine cultivation of material persistently produces the appropriate organisms, it is indication either (i) that the wound surface is subject to repeated reinfection, for one or more of the reasons already detailed, which would make it unsuited to the local application of an antiseptic, or (ii) that the organism is a resistant strain, in which case appropriate typing and sensitivity tests may be indicated. In any case, the application of the drug should never be continued indefinitely. The second general observation concerns the temporary bacteriostatic effect. Although streptococcal infection is often rapidly eliminated, and although the clinical appearance may improve accordingly and radical surgical closure may be effected after cessation of treatment, the same organisms often reappear on cultural examination. Elimination is relative, but not absolute. There may be reinfection from surrounding skin areas; but no doubt in many cases, when attempts at culture yield no growth, multiple or repeat swabs would often be found to contain organisms which had not been eliminated, but which had rather been reduced to ineffectual numbers. This is often noted when grafts which have been closed for from five to seven days are taken down. It is therefore necessary to keep watch on such wounds as long as raw areas persist, for a second or third course of local treatment may be needed to prevent recrudescence, with secondary breakdown in the vulnerable epithelium of a growing skin edge or a recent graft.

No drugs have been more abused as local antiseptics than the sulphonamides. Use outside their limited bacteriological indications, use in amounts or for periods unwarranted by response or lack of response to treatment, brings a whole train of disrepute. For this we blame those who grasp at sulphanilamide as a password, so that any lesion under their care is subjected to it, be it a tropical ulcer or an external otitis, not of streptococcal origin, or some indeterminate skin disease with many names but no established bacterial origin.

We read case reports of dermatitis from the local use of sulphanilamide, which, if it does occur, does so more often as a result of the abuse of so-called "local sulphanilamide treatment". The report of 55 cases of "sulphanilamide dermatitis" (Tate and Klorfajh[7]) would be badly read as an entity without realizing its comparative significance among the thousands of wounds which have derived benefit from this drug in the same theatre of war. Dr. Leonard Colebrook's letter concerning this report in

[1] The powder mixture, containing also 5% kaolin, is best sterilized in small jars with a screw top. Jars are filled two-thirds full, the top is screwed on and then the whole is autoclaved for thirty minutes in wet steam at not more than fifteen pounds pressure. No vacuum is used. After autoclaving, the jars are removed, and the powder is stirred with a sterile spoon. This prevents caking. We find that the powder does not stand resterilization. The blower must be sterilized separately.

The Lancet of February 5, 1944, is an apt warning. From his extensive experience, he states that the only few cases of dermatitis he has seen in association with local sulphanilamide treatment (three in 2,000) were shown to be due to another component of the cream he was using.

In this unit, sulphanilamide is used with impunity on wounds suited to its use, if—and only if—streptococcal infection is present, and then with respect to the principles already enumerated. Though we have seen general complications of sulphanilamide therapy—some of them severe—we have never seen skin complications from local treatment by sulphanilamide. An analysis of the records of the first 1,000 patients admitted shows that 116 had open, infecting, granulating wounds in which some secondary surgical procedure was indicated (in most cases closure by suture, or graft, or both) as soon as surface infection could be controlled. Fifty-four of these patients (47%) had mixed or pure infections with hæmolytic streptococci; 53 of them were treated with the local application of sulphanilamide as part of their preparation for operation. The results are represented in Table II.

TABLE II.

Wounds Infected with Hæmolytic Streptococci.

Results of Cultivation of Surface Swabbings before Operation, after Local Treatment with Sulphanilamide.		Result of Operation.		
		Good.[1]	Not Good.	Operation Not Performed.
No streptococci present	37 cases	27	10	—
Streptococci present	6 cases	—	3	3[3]
Culture not taken, attempted[2] or not recorded	10 cases	8	2	—
Total	53 cases			

[1] A "good" result is taken as a graft of 75% or over and no breakdown of any suture line. Anything less has been classed "not good" and includes the range of fair, poor and bad.

[2] In most of these, cultures were not attempted and operation was carried out on the clinical considerations of a healthy wound.

[3] In one of these cases, operation was postponed because of cultural findings in view of previous failures with the case. After treatment with proflavine cultural examination revealed no growth of hæmolytic streptococci, and secondary suture was successfully carried out. In the other two cases, slow, spontaneous healing occurred.

The value of sulphonamides in controlling the vast majority of hæmolytic streptococcal infections of surface wounds has been demonstrated in relation to this work, not only by the routine bacteriological examinations which have been made throughout, but in the reduced healing time of wounds, produced either by normal secondary intention activity, or more obviously and dramatically by the possibility of safe secondary surgical closure by methods such as were used before the introduction of sulphanilamide, but with results hitherto not achieved with the same uniformity. Indeed, such methods would by some have been considered contraindicated in these cases. In 1917, Carrel[9] knew of the significance of hæmolytic streptococcal infection in wounds, and to this end, stated that no secondary wound closure should be attempted in the presence of these organisms.

Take as an example one form of secondary closure employed when large skin losses are concerned—that of skin grafting. In 1939,[9] a detailed study was made of the results achieved by a group of surgeons doing this type of work over a long period. The best they could show was only 41% of what could be regarded as satisfactory results from the skin grafting of open, infected wounds after preparation by what were the best available methods. We did not understand at that time what is now so obvious—the adverse significance of surface streptococcal infection. When the same routine methods were used under worse conditions in the Middle East, but when what Colebrook had taught us of controlling surface hæmolytic streptococcal infection by sulphanilamide was kept in mind, in our first similar group of skin grafts,[10] 80% were in the class "good result"—almost double the pre-sulphanilamide figure. The same conclusions are noted by Mowlem[11][12] in 1944; he reports the same improved results in a large series of grafts, noting again the use of the same old methods by surgeons of the same school on the same type of wounds, but with sulphanilamide as a surgical adjuvant. These clinical results surely demonstrate the value of a local antiseptic at least on one type of wound for one type of infection.

We have seen ample demonstration of the benefit of sulphanilamide used locally as an adjuvant to surgical treatment, and would choose to continue its use, despite incidence in dermatological practice of complications associated more often with its abuse than with its use. If arsenic, digitalis and "Atebrin" were universally withheld because of complications arising from their abuse, or even for a few petty complications in an insignificant proportion of the multitudes for whom they do such good, it would be sad reflection. Yet Dr. E. H. Molesworth writes in THE MEDICAL JOURNAL OF AUSTRALIA of May 20, 1944, concerning dermatitis due to sulphanilamide. He records two cases, one of "*dermatitis eczematosa*" treated with sulphapyridine powder (an insoluble sulphonamide which has no rational place as a local antiseptic), and another of "eczema of the face and neck" treated, after misdiagnosis as erysipelas, with sulphanilamide given by mouth. In both of these cases alarming skin conditions developed. In conclusion, Dr. Molesworth states: "I understand that in the American Army and Navy, it is now forbidden to use the sulphonamide drugs unless there is a serious threat to the patient's life. It is to be hoped that similar prohibition will follow in British and Australian medicine. *Primum non nocere.*"

It seems that dermatologists are being sensitized to sulphonamides. If such requests for prohibition were directed to the use of sulphanilamide or any other drug, used in a way detailed in some of the case reports we are reading, the requests would be just. But to ask for a general prohibition is to jeopardize the rational and well-earned place of a valuable asset to surgical practice.

This matter is discussed in detail because what has been threatening the reputation of sulphanilamide will in turn threaten any new and better antiseptic in vogue.

Acridines.

The acridines are of particular local interest and easy to come by, owing to their recent development and manufacture under the guidance of Dr. Adrien Albert, of Sydney, who, from the laboratory, stands as their world authority. He has made available[13] details as to their structure and chemical properties as a rational basis for their use as local antiseptics. Active against a wider variety of micro-organisms than the sulphonamides, their range includes staphylococcal as well as streptococcal infections, including some of the latter which are sulphanilamide-resistant. Moreover, they are not inhibited in their action by pus and tissue debris. On the other hand, however, they have a more damaging effect on the tissues, a consideration which we had almost forgotten with sulphonamides. As they are relatively soluble drugs, it is important always to control their local concentration because of this necrotic action on the tissues if they are in too high concentration. On this basis, any technique for their use must be elaborated, or else their adverse effects on wounds will nullify their special usefulness.

Proflavine Sulphate (2-8 Diamino Acridine; Brown).—Mitchell and Buttle[14] made their first favourable clinical report on proflavine sulphate in connexion with grossly septic wounds, using the powder. From March to June, 1943, a clinical trial of proflavine sulphate was carried out in this unit on open granulating wounds with established infection. (Details of this report are extracted in Appendix I.) In comparison with sulphonamides, proflavine showed more marked antibacterial action, but, as has been noted by many others, when used as a powder in this way without control of its local concentration, it had an adverse effect on wound healing. It had a coagulating effect on wound surfaces, in which a fibrinous membrane often developed. There was not the epithelial activity of the wound edge which is usually noted in wounds cleaned with other agents. When secondary wound excision was indicated preparatory to any form of wound closure

(suture or graft), this local effect did not matter; but a wound treated with proflavine could not be subjected to direct grafting until the fibrinous coagulum had been removed by saline compresses, which took up to five days.

Concentrating on these disadvantages of proflavine, Albert has shown that the necrotic effect is due in large part to the high acidity of the drug (pH about 2). This he has largely offset by advocating[15] the use of a solution buffered with one-quarter of its weight of sodium bicarbonate. Moreover, local concentration on a wound can be better controlled by a solution, which also increases the range of wounds amenable to local treatment, many of which are unsuitable for powder insufflation. The wound should be clean and dressed with a tampon saturated in the solution at a strength of one in 1,000. This can be rewet twice a day, or by intermittent irrigation. Proflavine should not be used indefinitely. If the surface infection does not clear, the infecting organism is best regarded as proflavine-resistant. Treatment for five days should have the desired effect on a granulating surface, which should then be treated with saline solution for forty-eight hours prior to grafting. A second period of proflavine treatment may be indicated. In conformity with these indications and limitations, we have continued to use proflavine as a local antiseptic on wounds in the following circumstances: (i) when the predominant infection is staphylococcal; (ii) when sulphanilamide-resistant restrains of hæmolytic streptococcus are present (after failure with sulphanilamide); (iii) for wounds with regions inaccessible to powder insufflation, but accessible to a solution. Its adverse effects are eliminated by the precautions already enumerated: (i) to use a solution no stronger than one in 1,000; (ii) to use a buffered solution; (iii) to employ the treatment for limited periods of from five to seven days. Proflavine, used with due regard for these details, has increased the number of wounds which can be cleared of sepsis for more rapid healing or safer secondary surgical procedures (see Appendix II, case report).

Monacrin (5 Amino Acridine; Yellow).—Albert[13] has written of the relative advantages of monacrin compound, and Poate[15] of its clinical value in the treatment of chronic bone sepsis, by means of a technique of fluid irrigation which extends the range of a local antiseptic to otherwise unsuitable wounds. It would seem now that this is the acridine of choice to be used in a one in 1,000 solution, and having a favourable pH, it is used in ordinary unbuffered solution. Two minor advantages are claimed for it—that it is non-staining, and that it has some action on Gram-negative organisms; otherwise its use and indications are as for proflavine. Of the latter stated advantage, we have seen here no tangible evidence clinically or in routine bacteriological investigations.

Diflavine (2-7 Diamino Acridine; Red).—Diflavine has been reported[17] to have some increased action on Gram-negative organisms. Interested in this aspect, we obtained a small trial supply. Again we have seen no evidence whatever to support this claim, either from routine bacteriological examination of wounds or from the clinical condition of the wounds. The problem of finding some satisfactory antiseptic for infection with Gram-negative organisms is becoming more acute, for it seems that Gram-negative infection shows a reciprocal increase with diminution by antiseptics of Gram-positive infection. Although this may have little adverse effect on wound healing, it can be a problem where skin grafting is concerned.

Propamidine.

Propamidine (diamidinodiphenoxypropane-dihydrochloride) is one of the group of aromatic diamidines which have been shown to be active against some protozoal infections. We have used propamidine in a limited trial series, mostly with the open cavity type of wounds. A strength of one in 1,000 was used in a water-soluble jelly base as recommended by Thrower.[18] (See report extract, Appendix III.) Our conclusions concerning propamidine relative to proflavine were that propamidine has only the same advantage as proflavine in having a more marked effect on surface staphylococcal infections than sulphonamides or hypochlorites, and in reducing some streptococcal infections resistant to sulphanilamide. In these respects, it could not be considered better or worse than proflavine. However, the disadvantage of local tissue destruction was more marked with propamidine—it was sometimes noted after two or three dressings; dressings were changed every second day. This sometimes led to recrudescence of infection and discharge. Its only minor advantage was its colourless and non-staining nature, and so we consider that propamidine has no place in the elected range of antiseptics for clearing surface infections from wounds. It may be of some advantage in cases of gross bone sepsis with free discharge as reported[18] elsewhere, in association with or as a prelude to appropriate surgical treatment.

Tyrothricin.

Tyrothricin is a biological antiseptic from *Bacillus brevis*, consisting of gramicidin and tyrocidin. Though tyrothricin is used with advantage in veterinary work, there is no real evidence in favour of its clinical application to humans. Owing to characteristics *in vitro*, it has been held[19] that the tyrocidin element in this drug may be helpful in eliminating the pus due to Gram-negative organisms which is common with acridines and also with penicillin treatment. With this in view, two samples were tried here—one was from Dubos's original material, and the other was a local product. The tyrothricin was used as a solution with saline solution, one in 50,000, one in 10,000 and one in 1,000. Even with the one in 1,000 strength we could demonstrate no encouraging antibacterial results or change in the clinical condition of the wounds (see report extract, Appendix IV). What we did notice was the difficulty of obtaining an even and effective concentration over any granulating surface from a solution of a sample in limited supply. It would seem to this end that a powder used by similar technique to that of sulphanilamide with appropriate diluent would have been far and away the best method for local application to such wounds of an antiseptic in limited supply, and when there is no danger of obtaining too high a local concentration (both characteristics opposite to those of the acridines). Dubos himself complained recently, when asked to speak about tyrothricin, that he was asked "to ride a stubborn old donkey while others had a streamlined racehorse" (referring to penicillin[20]).

Penicillin.

The value of penicillin as a local antiseptic again implies correct technique of its use. There seems no danger of obtaining too high a concentration, but limited supply, instability and evanescent action are its special features to be recognized in connexion with its use as a local antiseptic.

We have used calcium penicillin as powder diluted with sulphanilamide powder (5,000 units of penicillin per gramme of powder) and also diluted with powdered dried human serum (3,000 to 4,000 units of penicillin per gramme of powder) on surface wounds infected with penicillin-sensitive organisms. We have also used calcium penicillin solution, 250 units per cubic centimetre, for wounds universally accessible only to a solution. In all these cases, such treatment has been carried out only on infected wounds as a prelude to or in association with elective secondary surgical procedures. The results are summarized thus: (*a*) Bacteriological results of local treatment with penicillin in 25 consecutive cases (Table III). (*b*) Clinical results of local penicillin treatment. In 21 of the 25 cases, operations were performed. Of these, good results were obtained in 17. In four cases, rapid spontaneous healing was effected; that is, in a total of 21 cases, the local use of penicillin was considered most beneficial. In the remaining four cases no ultimate clinical benefit could be attributed to the penicillin, and it is noteworthy that in three of these, failure was attributed—at least in part—to secondary acquisition of a Gram-negative infection.

In this regard, the following observations concerning its use have been made.

1. The powder is preferable and much easier to handle as a medium for local distribution, and I consider the fluid

TABLE III.

Bacterial Results of Local Treatment with Penicillin in 25 Consecutive Cases.

Wound Infection Before Local Treatment with Penicillin.		After Local Treatment with Penicillin.			New Infections During or After Treatment.		
		Infection Eliminated.	Infection Reduced.	Infection Not Affected.	Streptococci.	Staphylococci.	Gram-negative Organism.
Hæmolytic streptococci (pure or mixed) ..	9 cases	8	1	—	—	—	3
Hæmolytic staphylococci (pure or mixed)..	21 cases	14	6	1	—	8	7
Gram-negative organisms present, *Bacillus pyocyaneus*, *Bacillus proteus*, or *Bacillus coli*	2 cases	—	—	2	—	—	—

medium best reserved entirely for wounds inaccessible to powder insufflation by their shape or nature. The total quantities of powder required for use on surface wounds are extremely small. For surface wounds application twice a day seems more rapidly effective; but in all cases in which one daily application was used, the full antiseptic value was obtained in an average period only a few days longer. A full dressing was done only once in each day, and the dressing was carefully relifted for the second powder insufflation. It is considered that, as with all local antiseptics, removal of slough, debris, pus *et cetera* is necessary for access. (In closed wounds and cavities where the tube and solution technique is used, daily dressings can have no such value. Only the outer dressing should be removed for access to the tubes, and the changing of the full dressing is indicated only for inspection, for taking of material for bacteriological examination *et cetera*, and can well be reduced to every second or third day.)

2. The insufflator used was kept in the refrigerator between uses and sterilized between refills. Its proportions should permit of its use well away from a wound. No diminished clinical effect has been noted in the samples of powder kept thus for over three weeks. The only noted difference between serum and sulphanilamide dilution is that the serum mixtures, not quite so fine, are more rapidly dissolved and distributed over the wound surface.

3. In wounds infected with hæmolytic staphylococci and streptococci, considerable clinical improvement is evident in two to five days. Discharge is much reduced and there is marked epithelial activity relative to the granulation process—that is, unretarded, normal and natural healing.

4. Hæmolytic streptococci are the most rapidly eliminated of organisms from wounds; they usually disappear in two or three days. Hæmolytic staphylococci are reduced in three to five days in a way which has never been noted with other antiseptics. Their diminution is gradual, through successive days of "pure culture", "scanty growth", "few colonies" and "no growth". After cessation of treatment, organisms often recur in cultures in a few days, staphylococci more readily and more often than streptococci.

5. Though cultivation of surface swabbings shows no growth after three days' treatment, it is common in a few more days—whether penicillin therapy is continued or not—for Gram-negative organisms to appear and increase. This may correspond with an increased amount of surface discharge. Penicillin has no effect on infections by *Bacillus coli*, *Bacillus proteus*, or *Bacillus pyocyaneus*, except apparently to favour their growth. This aspect is not altogether negligible, and such infection may have some adverse effect on some surgical procedures.

6. No local damaging effects have been noted on any wound. There has been no evidence of diminished healing in the wound attributable to the penicillin itself. One rash was noted about a wound doing well under treatment with penicillin and serum powder. These rashes are often noted about any septic wound associated with discharge, no matter what the antiseptic with which it is dressed. They are better associated with the infection than with the method of treatment. (Perhaps many cases of so-called "sulphanilamide dermatitis" could well be thus explained).

7. Grafts have been directly applied on wounds lightly frosted with penicillin powder, and no adverse effect has been noted on the "take" of the skin.

It seems that what can be done with other antiseptics can be done with penicillin appropriately used, more often, sooner and with more uniformly good results. As soon as supplies are available, we must regard the sulphonamides and the acridines as ancient history for routine use, though they must retain a place with some of the penicillin resistant or insensitive infections and as ingredients of various antiseptic "mixtures". In this paper I have refrained from the obvious consideration of mixing antiseptics now on trial. The combination of stronger bacteriostatic function and complete lack of local damaging effect makes penicillin the local antiseptic of choice for appropriate infections. Used in preparation for or in association with surgical procedures on wounds, it may well not only lead to a change in our attitude towards secondary surgical closure of wounds, but it may permit of measures in primary treatment which would previously have been ill-advised.

No doubt there is still much to learn of how to use penicillin most efficiently as a local antiseptic; but no matter what its ultimate place becomes, in common with all its predecessors it is still open to abuse, and the principles enunciated concerning the local use of any antiseptic will hold fast. These imply the following precautions: (i) that surgeons must take a new interest in the bacteriology of wounds, so that the correct antiseptic can be chosen and its effect followed; (ii) that any technique of application must be carefully elaborated and carried out with respect to the physical, chemical and antibacterial properties of the antiseptic; (iii) that until the Utopia of an aseptic era can be practised in surgery, correctly used local antiseptics must rank among the primary weapons of surgical practice; but we must realize that all of them, penicillin included, have their limitations, outside which their haphazard use is as unintelligent as it is useless, and their use becomes abuse.

Acknowledgements.

I wish to thank Major-General S. R. Burston, Director-General of Medical Services, for permission to publish this paper, and also Colonel E. V. Keogh, Dr. A. Albert, of Sydney, Captain V. Bazeley and Captain J. Perry for their advice and practical help in various ways during these investigations.

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Appendix I.

Extract of Report of Clinical Trial of Proflavine Sulphate (First Twelve Cases).

Method.—In all cases the dry powder was insufflated on or into the wound. In a few cases, this was covered with a dry dressing; but in all others, an outer moist saline dressing was used, and this is considered more effective.

Local Antiseptic Value.—On most infected surface wounds, proflavine sulphate caused rapid reduction of pus formation and surface discharge.

Streptococcal Infection. Streptococcal infection in most cases was rapidly eliminated, but no more quickly than by sulphanilamide. Of special note was the rapid and effective elimination of streptococcal infection in two cases in which the infection had not responded to sulphanilamide, or the organisms had become sulphanilamide-resistant.

Staphylococcal Infection. There was a great reduction in staphylococcal infection in all cases, and total elimination in some cases. This corresponds with reduction of discharge. Proflavine would seem to be more efficacious in reducing staphylococcal infection than eusol and saline solution.

Pyocyaneus Infection. No infection with *Bacillus pyocyaneus* cleared with treatment by proflavine sulphate. Two such infections actually appeared as secondary infections during proflavine treatment.

Diphtheritic Infection. Two local diphtheritic infections were rapidly eliminated by proflavine. This organism can be resistant to treatment as a wound infection, as it had been in these cases under previous treatment, including large dosage of antidiphtheritic serum. A second recurrence of *Corynebacterium diphtheriæ* in one of these wounds after cessation of proflavine treatment was also rapidly cleared on resumption of proflavine sulphate dressings. After cessation of the local use of proflavine, the infection—which had been controlled—was again noted to reappear.

It seems that by proflavine, as by all local antiseptics, there is brought about reduction but not complete elimination of an infection, or infection may again spread from local surrounding areas not reached by the drug.

Effects on Wound Healing.—Proflavine sulphate in the concentration used in this series had an adverse effect on wound healing. It acts as a coagulant on all granulating wounds. The yellowish, fibrinous membrane covering the wounds, as described by many others, was noted. Despite effective antisepsis, granulations were always of a most atrophic and irregular nature—never suited to skin grafting, for example. There was not the marked epithelial activity of wound edges which runs *pari passu* with effective wound antisepsis by sulphanilamide and saline treatment, for example, or by eusol and saline solution.

Appendix II.

Extract of Case Report.

The patient had a chronic, unhealed abdominal wound of nine months' duration, following a laparotomy incision, with wound breakdown and infection. Three months later it was still unhealed, with indolent overhanging edges. It was excised and closed by direct suture, but again broke down with infection and remained unhealed, presenting the typical appearance of a chronic wound. Many investigations into the delayed healing were carried out with negative results, and the patient spent a long period in a plaster jacket. (See Table IV.)

Appendix III.

Extract of Report on Clinical Trial of Propamidine for Wound Sepsis (First Twelve Cases).

Local Antiseptic Value.—As with proflavine, wound discharge was, in most cases, early and rapidly reduced by propamidine.

Staphylococcal Infection. *Staphylococcus aureus* infection was present in all twelve cases. In eight of these the organisms were eliminated from culture material during

TABLE IV.

Date.	Clinical Progress.	Result of Cultivation of Surface Swabbing.
April 16, 1943 ..	Eight months after original operation an unhealed wound, four inches by two inches, with fibrotic overhanging edges. Much surrounding and deep fibrotic induration typical of a chronic wound with persistent streptococcal infection. Patient on sulphanilamide and saline solution routine treatment, preparatory to wound excision and secondary repair.	β-hæmolytic streptococci (not grouped); *Staphylococcus aureus* (coagulase-positive).
April 20, 1943 ..		β-hæmolytic streptococci (not grouped) predominant; *Staphylococcus aureus* (coagulase-positive).
April 25, 1943 ..	In view of persistence of streptococcal infection, all details of dressing were checked. Patient was masked, and dressings done by only one medical officer.	β-hæmolytic streptococci (not grouped) predominant; *Staphylococcus aureus* (coagulase-positive).
April 27, 1943 ..	——	β-hæmolytic streptococci, *Staphylococcus aureus*.
April 30, 1943 ..	——	Wound swab: β-hæmolytic streptococci, group A, predominating; a few diphtheroids and Gram-positive cocci (coagulase-negative). Throat swab: Green streptococci (predominant); diphtheroids, *Staphylococcus albus*, ? green or β-hæmolytic streptococci (few).
May 1, 1943 ..	As wound continues to show β-hæmolytic streptococci, patient started on routine proflavine treatment.	β-hæmolytic streptococci (predominating), few diphtheroids and Gram-positive cocci.
May 2, 1943 ..	——	No growth.
May 3, 1943 ..	——	No growth.
May 7, 1943 ..	Operation: After preparation on operating table, radical excision of the wound and surrounding block of tissues. Closed in layers by direct suture with two small drains.	——
May 14, 1943 ..	Wound dressed—all clean; drains removed.	No growth.
May 17, 1943 ..	Half sutures out.	——
May 19, 1943 ..	All sutures out; wound completely healed.	——
May 20, 1943 ..	Patient up; wound remains healed.	——

treatment; but in five of these they reappeared after cessation of treatment (as is the usual behaviour with surface antiseptics).

β-Hæmolytic Streptococcal Infection. In three of four cases, the organisms were eliminated during treatment. As in Case I, these organisms had proved sulphonamide-resistant, and in Case II they were eliminated from the wound in the same way as they had previously been eliminated with proflavine, only to reappear.

Bacillus pyocyaneus and *Bacillus proteus*. *Bacillus pyocyaneus* (in two cases) and *Bacillus proteus* (in five cases) appeared during treatment where they had not been found in previous cultures; this would seem more than coincidence in this small series, and it appears—as with proflavine—that Gram-negative organisms increased in the wound as the Gram-positive organisms were eliminated. These organisms may not matter in all surgical procedures, but they can be detrimental to some (for example, skin grafting).

Effect on Healing.—The same surface destruction of granulations by propamidine was noted as with proflavine, but generally much sooner, and in some of the cases, as early as the third day, or after the second application. No diminution of epithelial activity was seen, but it should be noted that the drug was not used for long periods.

Appendix IV.

Extract of Report of a Clinical Trial of Tyrothricin for Local Treatment of Wound Sepsis (First Thirteen Cases).

Method Used.—Tyrothricin was made up with saline solution and used in strengths of one in 50,000 (five cases), one in 10,000 (five cases) and one in 1,000 (three cases). The dressing routine throughout was as follows: (i) The wound surface was thoroughly cleansed with saline solution. (ii) A thick, flat, gauze dressing was applied with one or more small holes through which rubber tubes were passed to the innermost layers of the dressing. These holes and tubes were arranged with respect to gravity and to the shape and nature of the wounds. (iii) A pressure bandage was used outside the gauze, the outer end of the tube being left free. (iv) The solution was run down the tube by a syringe in amounts of ten to thirty cubic centimetres, according to the size of the wounds. (v) A second gauze tampon was placed over the exposed ends of the tube and the round-and-round bandage was completed to include this. In the evening, the dressings were reopened only far enough down to expose the outer end of the tube, and the same amount of the solution was run in without disturbing the dressing; that is, the wounds were inspected and cleaned daily. Surface swabbings for bacteriological examination were taken every day.

Conclusions.—The conclusions drawn from this small trial series are as follows. (i) In only two of the thirteen cases could any value relative to other tried antiseptics (sulphonamides, proflavine sulphate and propamidine) be attributed to tyrothricin. (ii) β-hæmolytic streptococcal infection was eliminated from the wound in only one out of seven wounds in which it was present at the commencement of the treatment. It has to be noted that four of these wounds had previously failed to respond to sulphanilamide. (iii) *Staphylococcus aureus* infection, though present in all thirteen cases, was eliminated from only one of them. (iv) Infection by the Gram-negative organisms *Bacillus pyocyaneus* and *Bacillus proteus* was never reduced, and in many of the wounds it became more obvious. (v) No damaging local effects on granulations or growing skin edges were noted, even with the one in 1,000 solution, and tyrothricin did not interfere with the successful "take" of skin applied concomitantly with it on granulating surfaces.

The final conclusion is that tyrothricin, as supplied and used by the above method, had no special beneficial effect on these wounds.

AN INVESTIGATION OF THE HÆMATOCRIT AND A SUGGESTED METHOD FOR THE STANDARDIZATION OF HÆMATOCRIT READINGS.

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By means of the hæmatocrit sedimentation of the red cells of the blood may be rapidly and completely brought about. The sediment is conveniently referred to as the packed cell volume, which, expressed as a percentage of the whole blood, is known as the hæmatocrit value. The determination of this value is open to numerous influences, so that if it is to be accurately determined and if universally comparable figures are to be obtained, a standardized technique must be used. These influences may be classified into two groups: (*a*) those due to changes in the blood during and after collection; (*b*) those associated with the hæmatocrit and spinning apparatus.

Influences due to Changes in the Blood during and after Collection.

The Anticoagulant.

It has been shown that if blood is used without any anticoagulant, as advocated by Koeppe, partial coagulation occurs, the volume of the erythrocytes being thereby increased even by as much as 10% to 15%.[11] An anticoagulant is therefore essential; but its use may be the source of one of the largest and most frequently occurring errors, because a very slight change in the osmotic pressure of the fluid medium surrounding the corpuscles will result in quite a perceptible alteration in their volume.

The anticoagulant may be added to the blood either as an isotonic fluid or in small amounts in dry form. The use of isotonic sodium oxalate solution to prevent both shrinkage and clotting of the cells was first suggested by Whipple *et alii*,[5] who used a 1·6% solution. Various other authors have recommended other values—1·3%,[15][18] 1·4%,[3] 1·6%.[20] A 1·6% sodium oxalate solution would be isotonic with a 0·95% sodium chloride solution[19]; but red cells do not behave as pure osmometers,[13] so that calculated values for isotonic and hypotonic solutions are at variance with those found experimentally.[11] This, coupled with the fact that the tonicity of blood from different subjects varies within slight limits, makes the use of so-called isotonic solutions unwise.

Of the dry anticoagulants, heparin and hirudin are most suitable, because the small requirement (one to eight milligrammes per 100 cubic centimetres of blood) has a negligible effect on the osmotic pressure of the plasma. Their cost, however, is prohibitive. If dry potassium oxalate is used as an anticoagulant, the error thus introduced may be considerable. Whipple *et alii*[5] found that a 0·1% oxalated blood solution (that is, 100 milligrammes per 100 cubic centimetres of blood) caused a 3% change in cell volume; but Van Allen[18] for the same concentration allows a 5·5% change. Osgood,[9] using a 0·2% solution, obtained a 3·5% shrinkage; for the same concentration Whitby and Britton[20] recommend a 9% correction factor, whilst for a 0·4% solution Wintrobe[2] allows 6·7% for diminution in cell size. The irregularity of these findings is most likely associated with factors other than oxalate concentrations, as will be shown later. However, since no series of results seems to have appeared showing the relationship between oxalate concentration and packed cell volume, this point was investigated.

The method employed was as follows. From appropriate stock solutions, amounts of from 0·25 to 2·0 cubic centimetres of potassium oxalate solution were placed in small bottles of known weight and evaporated to dryness. Blood was withdrawn from an arm vein into a paraffined syringe, and approximately one cubic centimetre was ejected from the syringe into each of the oxalated bottles. They were immediately shaken to get the oxalate into solution, and reweighed. Thus the percentage oxalate concentration was accurately determined. In the case of those observations recorded in Figure I, the blood was centrifuged for thirty-five minutes at 4,500 revolutions per minute mostly in small capillary hæmatocrit tubes; but some groups were spun in Wintrobe tubes measuring 11 centimetres by four centimetres and read with the aid of a lens. A few samples were spun with dry heparin as anticoagulant in what amounted to a 0·01% blood solution. As a further control, in some cases non-oxalated blood was spun in paraffined tubes, which were surrounded by jackets packed with ice and a little salt, in order to prevent clotting. High, intermediate and low oxalate concentrations were spun in alternating sequences, so that any error due either to carbon dioxide loss or to sedimentation on standing would be minimized. In all experiments described in this paper hæmatocrit readings were obtained in duplicate; the difference between the two was rarely more than 0·4 unit on the 100 scale, and the mean figure has been used throughout.

Figure I shows the result of 50 determinations on a subject whose average red blood cell count was 5,600,000 cells per cubic millimetre and hæmoglobin value 17·0 grammes per 100 cubic centimetres. It can be seen that at high concentrations (2·5%) a more or less constant value for the plasma/cell ratio is obtained. This value showed variations of ±6%; but at high concentrations a little hæmolysis was often apparent, and this is probably responsible for the variation. The readings of the tubes spun in ice gave values almost identical with those spun in a like manner with heparin; this shows that heparin causes no appreciable change in reading.

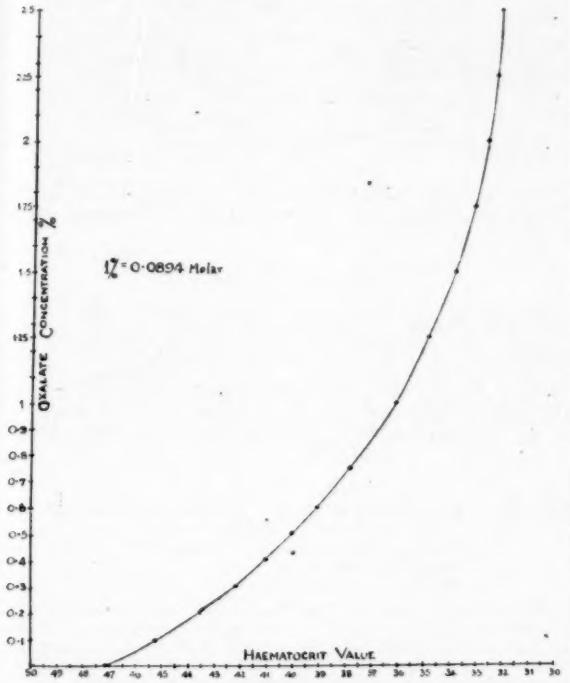

FIGURE I.

It has been shown by Quick[13] that clotting is not inhibited if only just sufficient oxalate is added to precipitate the total blood calcium content; "somewhat less than three times the amount of sodium oxalate required to precipitate the total calcium content is necessary to prevent coagulation in the presence of optimal concentrations of thromboplastin". In Quick's experiments this figure corresponded to a 0·05% solution of blood and sodium oxalate. During this series of tests it was found that clotting almost always took place when the concentration of dry potassium oxalate in the blood was below 0·05%—that is to say, less than a 0·0045 molar solution, but never at or above this figure.

Figure II shows the effect of different oxalate concentrations on various red cell concentrations. The red cell values were obtained by adding either cells or serum to normal heparinized

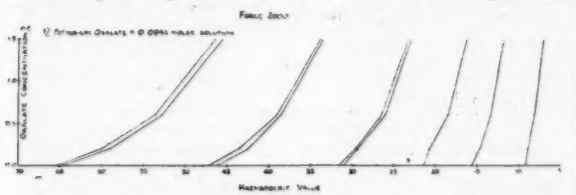

FIGURE II.

blood and thus making it either polycythæmic or anæmic. The cells and serum were obtained by spinning some of the same normal blood. Each particular concentration of cells was divided into four groups, requisite amounts of potassium oxalate were added, and the four groups were then spun together at the same time. The force of centrifugation in all cases was 2,000 dynes, but the duration of centrifugation differed for each cell concentration; the time, as will be shown later, was double that calculated from Figure VI.

It would be expected that the same percentage decrease in the volume of the cells would always be brought about by a given oxalate concentration, whether a large or a small number of cells was present Such does not appear to be the case, however, as is demonstrated in Figure III. Here the changes in the hæmatocrit values in Figure II due to the potassium oxalate are expressed as percentage changes and plotted against the oxalate concentrations. It can be seen that at any given oxalate concentration a larger percentage diminution in packed cell volume occurs in blood with a high hæmatocrit value than it does in blood with low value.

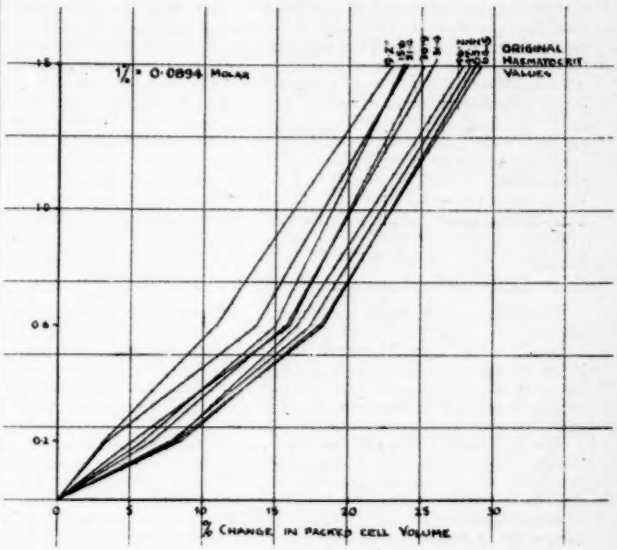

FIGURE III.

On statistical examination, these figures show that the possibility that the diminution is genuine is one hundred to one against its being due to chance; also, an almost constant regression coefficient is obtained. An explanation for the phenomenon can possibly be found, not in the assumption that a lesser shrinkage takes place at the low cell values, but that with the higher hæmatocrit values the column of corpuscles is much longer and a greater packing force would be squashing the cells at the bottom of the centrifuge tube during centrifugation and thus causing a greater percentage diminution in cell volume.

Errors Due to the Method of Collection.

It has been demonstrated that circulatory stasis for twenty-five minutes will cause the hæmatocrit value to rise 5·2 points.[1] Normally, during blood collection the period of stasis would not be so long as this, but it might conceivably be as much as five or six minutes. Seven tests were made with the period of stasis varying from five to nine minutes. As a control the arm was warmed, a light tourniquet was applied and the hypodermic needle was inserted into the corresponding vein; the tourniquet was quickly removed, and one or two minutes later "non-static" blood was removed. A greater hæmatocrit value was found in all specimens of "static" blood, the average increase being 2·3 points. This increase is due to the interaction of several factors, the first of which is a change in the osmotic pressure of the plasma due to loss of fluid from the vessels of the arm. Dautrebande, Davies and Meakins[1] calculated that after circulatory stasis for twenty-five minutes the blood drawn from the arm could lose 30% of its plasma volume owing to the increase in tissue fluid. Such a loss would increase the concentration of the osmotically active plasma proteins, which, acting on the red cells, would reduce their size; also, there would be an accumulation of osmotically active products from metabolic activity. An experiment was conducted to demonstrate the increase in osmotic pressure of the plasma.

After circulatory stasis for seven minutes the mean depression of the freezing point for two specimens was 0·056° C. lower in the "static" than in the "non-static" blood. Such a depression would be caused by an extra 510 millimetres of osmotic pressure, which would cause a considerable decrease in hæmatocrit value.

The second factor causing an increase in hæmatocrit value in "static" blood is concentration of cells due to loss of fluid from the vessels of the arm. The increased concentration of red cells cannot be demonstrated by a cell count, because the accuracy of two counts is open to errors of up to 12%.[10] However, it has been shown that there is an increase in oxygen capacity of almost 20% after circulatory stasis has been applied for twenty-five minutes,[1] and thus the concentration of red blood corpuscles must have been considerably increased. In the following experiments this increase was demonstrated by comparing the increase in blood viscosity with the smaller increase in plasma viscosity for "static" and "non-static" specimens of blood. The viscosity was determined by means of a W. R. Hess viscosimeter. In this method water and blood are sucked along the parallel arms of a U-tube, and a comparison is made between the lengths of the columns of the fluids (Table I).

TABLE I.

Fluid.	Viscosity of "Static" Blood.	Viscosity of Non-static Blood.	Difference.
Blood	5·85	5·00	0·85
Plasma	2·80	2·20	0·60

The difference between the increase in blood viscosity and the increase in plasma viscosity is 0·25.

It can be seen that the viscosity of whole blood was increased by 0·85 by stasis for seven minutes, whereas the viscosity of the plasma was increased by only 0·60. Thus the viscosity of whole blood was increased 0·25 more than the plasma, showing that more red cells must be present.

The third factor causing an increase in hæmatocrit value in "static" blood is the influence of increased carbon dioxide tension. Here several factors are involved. By means of the A. V. Hill vapour pressure method, it has been shown that the addition of a 5% carbon dioxide environment to blood causes an increase in osmotic pressure equivalent to a 0·32% sodium chloride solution.[16] The influence of the carbon dioxide accumulated during short periods of circulatory stasis would thus cause the hæmatocrit value to be lowered several points. However, an increase in the pH of the blood increases the corpuscular volume.[17] Thus, the acidosis caused by circulatory stasis would tend to increase the hæmatocrit value. Smirk has shown that the gross influence of increased carbon dioxide tension is to increase the hæmatocrit value. He oxygenated normal venous blood and found the corpuscular volume to be decreased on an average by 0·6 point. With 50% carbon dioxide concentration he obtained an increase in packed cell volume of 11%. Four samples of blood were equilibrated in the following two different environments: (i) 0·1% carbon dioxide and 20·9% oxygen; (ii) 5·0% carbon dioxide and 21·1% oxygen. Those from the latter environment showed an average increase of 3·6% in hæmatocrit value over those from the 0·1% carbon dioxide atmosphere. Thus it can be concluded that the influences of carbon dioxide in increasing the corpuscular volume, whether they act by a change in pH concentration or are associated with the water intake of the chloride shift phenomenon, outweigh the influence carbon dioxide has on increasing the plasma osmotic pressure.

Errors Due to Variations in Temperature.

It was thought that a change in temperature of the blood after withdrawal might impair the accuracy of the hæmatocrit determination. To test this, four Wintrobe tubes were spun together in water jackets. Two of the jackets were initially at 24° C., but their temperature rose 6° C. during centrifugation, while the other two jackets were filled with water at 50° C. every eight minutes during a total period of spinning of forty minutes. The mean result of three experiments showed that the hæmatocrit value of the hot tubes rose on an average 0·3 of a point (0·7%); this value is, of course, insignificant.

Errors Due to Standing at Room Temperature.

If blood is allowed to stand at room temperature, a change in packed cell volume occurs.[2] During the first five hours there is a fall of one or two points, but during the subsequent twenty-four hours the figure rises to or above the original value. With heparin as anticoagulant, the following results were obtained, the time and rate of spinning in all cases being constant (Table II).

TABLE II.

Time Since Blood was Taken.	Hæmatocrit Value.
0·5 hour	50·7
1·5 hours	50·0
2·5 hours	49·7
3·5 hours	49·2
4·5 hours	48·9
5·5 hours	48·8
26·5 hours	50·7
10 minutes	49·8
24 hours	52·0

Guest and Siler[2] attribute the cell shrinkage to loss of carbon dioxide and the subsequent increase in size to the action of the lactic acid produced by glycolysis.

Errors due to the Apparatus.

Force.

The packing power of one centrifuge can be duplicated in another only if the centrifugal forces used and the duration of spinning are the same. These obvious factors have been pointed out on several occasions[18][3]; but a consideration of the centrifugal force is often neglected in hæmatocrit determinations. This force varies directly with the radius and also with the square of the speed; that is, $G \propto \text{speed}^2 \times \text{radius}$, or more exactly

$$G = \frac{(2\pi S)^2 R}{g}$$

$$G = 0{\cdot}040 \times S^2 \times R \text{ dynes.}$$

where G = degree of centrifugation obtained compared with the "force" of gravity which is taken as unity.
S = speed in revolutions per second,
R = radius in centimetres,
g = 980 dyne centimetres.

The influence that change in radius alone has upon the hæmatocrit value is shown by the following example. Three samples of blood were spun separately at 2,900 revolutions per minute for fifty minutes on three separate radii, the radii being measured from the axis to the bottom of the Wintrobe tubes. The results are shown in Table III.

TABLE III.

Radius. (Centimetres.)	G.	Average Value.
21·0	2,196	51·1
14·8	1,383	52·0
13·5	1,262	52·2

The influence of various speeds has been shown by many observers. Van Allen[18] claimed that "there is an ultimate concentration up to a certain point (2,700 revolutions per minute) above which there is no further change in final reading". However, Millar[7] found that as the rate was increased from 4,350 to 11,600 revolutions per minute, the percentage volume of the cells fell from 39 to 35. This divergence in findings was investigated by spinning samples of the same blood at three speeds for the same duration and at the same radii in Experiment I and for different durations in Experiment II. The results are shown in Table IV.

TABLE IV.

Experiment I.		Experiment II.		
Speed. (Revolutions per Minute.)	Average Value.	Speed. (Revolutions per Minute.)	Average Value.	Time of Spinning. (Minutes.)
2,000	54·0	2,000	52·4	100
2,900	49·8	2,900	50·8	84
4,000	48·3	4,000	47·4	50

Thus there is no "ultimate concentration" at 2,700 revolutions per minute as Van Allen claims.

The variations due to speed and radius can be readily correlated by means of the above formula ($G = 0{\cdot}04 \times S^2 \times R$), so that for a given G a given specimen of blood will always give the same hæmatocrit reading. Several samples of blood were spun for the same duration at different radii but with the same centrifugal force. In all cases it was found that, provided the force was the same, the readings would be almost identical. Two examples are shown in Table V.

TABLE V.

	Speed. (Revolutions per Minute.)	Radius. (Centimetres.)	G.	Duration. (Minutes.)	Average Hæmatocrit Value.
I	3,500 2,900	14·8 21·0	2,014 2,196	44 44	47·8 47·5
II	2,380 2,000	14·8 21·0	931 933	40 40	50·9 50·7

Duration of Centrifugation.

A common method of centrifugation is to spin to constant volume—that is, making observations at intervals until the cell volume appears to be constant. McLean[6] and others[3] have shown quantitatively how the duration of spinning affects the hæmatocrit value. It has also been shown that at different speeds different periods of time are required to attain the same packed cell volume.[4] Thus the time required to attain constant volume is dependent to a large degree on the centrifugal force used. The graph in Figure IV illustrates this point. Here

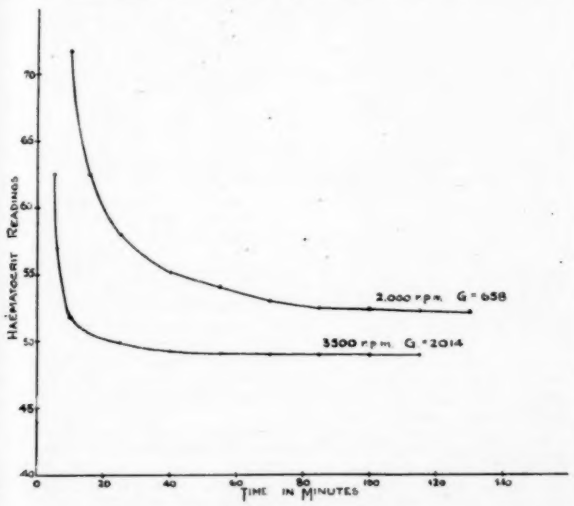

FIGURE IV.

two samples of the same blood were spun at 2,000 revolutions per minute ($G = 658$) and 3,500 revolutions per minute ($G = 2{,}014$). It can be seen that not only did it take almost two hours when G equalled 658 and fifty minutes when G equalled 2,014 to obtain constant values, but also that the "constant" values differ from each other by 3·3 points. Guest and Siler[2] hold that the same hæmatocrit values can be obtained by centrifugation for four or five minutes at 14,000 revolutions per minute ($G = 16{,}333$) as by spinning for 30 to 45 minutes at 3,000 revolutions per minute ($G = 2{,}000$). This rather gives the impression that a simple equation might be demonstrable, consisting of $K = G \times$ time (in minutes), so that for a given value of K the same hæmatocrit value would be obtained. This equation was found not to be valid, although its use did tend to restrict variations; it was consistently found that when higher speeds were employed the packed cell volume was always slightly lower, notwithstanding the time correction.

Variations due to the Use of Types of Blood with Different Viscosities.

Blood with a high viscosity (as, for example, in polycythæmia) will require a greater centrifugal force for sedimentation than would normal blood.[14] Conversely, in anæmia one would expect that less force would be required to obtain the same degree of packing. These points were put to the test by spinning various specimens of blood whose viscosities had been either increased by the addition of red cells or decreased by the addition of plasma. The viscosity of these samples was measured and spinning was carried out in duplicate at three different forces: 658 (2,000 revolutions per minute), 1,680 (3,200 revolutions per minute), and 2,368 (4,000 revolutions per minute). Readings were taken at frequent intervals, so that for each sample a curve similar to that in Figure IV was plotted, and thus the time required for the cells to obtain constant volume could be seen. However, since the curve becomes flat very gradually as the time advances, it is difficult to give very exactly the time required to obtain the point of constant volume. By taking a value on the graph one point higher than where the curve is fairly flat, a more accurate and comparable time figure is obtained for each sample of blood. This figure is something like one-half the true constant volume time. The times, viscosities, hæmoglobin contents and forces of centrifugation are shown correlated in Figure V. Here it is demonstrated how in blood with a low hæmatocrit value and consequently low viscosity, sedimentation is produced with far greater rapidity than in blood with a high hæmoglobin content, and the important relationship between the force and duration of centrifugation is also emphasized.

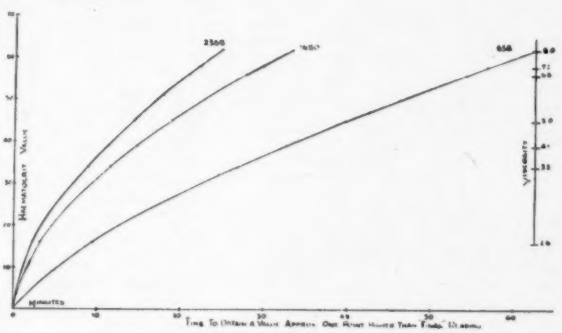

FIGURE V.

The graph in Figure VI has been calculated from that in Figure V, and shows the relationship between force of centrifugation and hæmatocrit value or viscosity in obtaining a value one point above constant volume. Using Figure VI, and knowing the viscosity or approximate hæmatocrit value of the blood used, one may estimate the time and/or force required. In order to spin to an absolutely constant volume, almost double the time shown on the graph is required.

It might be thought that if blood with low viscosity was spun at high speed for an hour or so, the corpuscles would be deformed and perhaps hæmolysed and thus the hæmatocrit value would be too low. Two smears were made of samples of blood with hæmoglobin contents of 16% and 34% which had been spun for 90 minutes at G equalling 2,368 (4,000 revolutions per minute). No hæmolysis was present, and none of the cells on the slides appeared to be deformed.

Changes due to the Hæmatocrit Tube.

Van Allen[18] mentions that "it would appear that the rapidity of sedimentation is accelerated by an increase in the diameter of the hæmatocrit bore". Several samples of blood were spun in capillary hæmatocrit tubes and in Wintrobe tubes (diameter four millimetres), and the speeds were adjusted so that the G factor was the same in both cases. It was found that the capillary tubes showed readings on an average of 0·3 point higher; but this is within the margin of error of the readings. Similarly, it has been shown that the length of the column of blood for lengths between 20 and 55 millimetres makes no significant difference in the hæmatocrit value,[2] although it would seem from Figure III that the length of the packed cell volume is of some significance.

Recommendations for Standardization.

From the foregoing experiments it would seem that if universally comparable hæmatocrit determinations are to be made the following precautions should be taken:

1. A known force of centrifugation must be used. It is recommended that a *G* of 2,000 be used, or that a suitable correction for the particular force used be made to the duration of centrifugation by reference to Figure VI.

2. The time of centrifugation should be calculated with reference to the viscosity of the blood and the force of spinning. This can be done by means of Figure VI and the result multiplied by two. It would be necessary to take the blood viscosity; but this is a rapid procedure, and if the viscosity was low much time could be saved in the actual duration of spinning.

3. A correction must be made for the anticoagulant. If potassium oxalate is used, the percentage shrinkage of the cells can be obtained by reference to Figure III.

As an example of the above recommendations, let us suppose that an accurate determination of the packed cell volume is required of five cubic centimetres of blood which has been added to a bottle in which a solution of potassium oxalate has been dried so that it contains 0·01 gramme, and thus a 0·2% solution is now formed with the blood. If the blood viscosity is found to be 4·8 and the *G* of centrifugation is to be 2,000, then reference to Figure VI shows that 17·0 minutes are required to spin to one point above final volume, and thus the total time of spinning should be 34 minutes. After centrifugation the hæmatocrit value is found to be 41·4, but the packed cells have been subjected to an osmotic pressure from a 0·2% potassium oxalate solution, and this value is therefore too low, so reference is made to Figure III to correct this. A value of 41·4 is not given on the graph; but if the nearest value on the graph above 41·4—namely, 46·2—is used, only a small error will occur. It can thus be seen that a 0·2% solution would result in 8% shrinkage of the original cells. Thus, if X is the true hæmatocrit value, then $\frac{92}{100}x = 41{\cdot}4$ and $x = 45$.

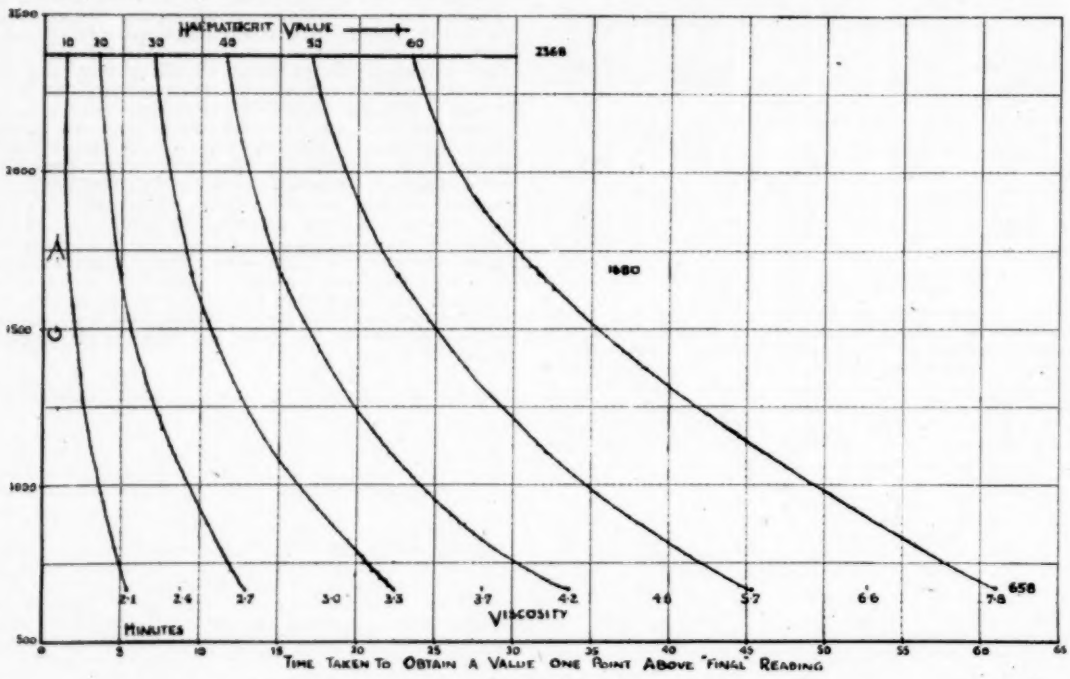

FIGURE VI.

Summary.

1. Various errors which may occur in hæmatocrit determinations have been investigated and discussed.

2. Graphs are given showing the effect of different concentrations of dry potassium oxalate upon the packed cell volume (Figures I and II) and upon the percentage change in volume of the red cells (Figure III).

3. The influence that small periods of circulatory stasis have upon the hæmatocrit value has been investigated and discussed.

4. Graphs are given showing the relationship between force and duration of centrifugation, and viscosity and hæmatocrit value (Figures V and VI).

5. Recommendations for the standardization of hæmatocrit determinations are made and an example is given.

Acknowledgements.

I wish to thank Professor C. G. Lambie and Mr. M. Morrissey for advice and assistance, and Miss M. Hornby, of the Biometric Department of the McMaster Laboratories, for a statistical analysis of some of the findings.

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Reports of Cases.

UNCINATE EPILEPSY: THE SUBJECTIVE SYMPTOMS OF AN ATTACK.

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Lieutenant-Colonel, Australian Army Medical Corps.

Clinical Record.

A SAPPER, aged thirty-four years, was referred to a forward Australian general hospital in New Guinea for consultation with a physician. The regimental medical officer of his unit referred to the soldier's peculiar behaviour and to the strange symptoms of which he complained, and considered him in need of psychiatric examination. The patient was an intelligent man who had been a roving gold prospector in civil life.

The consultant, whose ears were somewhat dulled by the repetition of symptoms of "P.U.O." and "N.Y.D. (N)", was electrified by the following history, which was told in quaint phraseology, without prompting or leading question. The patient later wrote down his story, and this unedited description of uncinate attacks, of unusually classical type, is considered worthy of record.

> This constitutes an effort to describe the indescribable and define the indefinable. I ask only that the reader try to understand what I am trying to say rather than pay heed to the actual words used in the effort.
>
> This is my third attempt, and the foregoing remarks are all I can add to the original which falls far short of what I would like.
>
> For many months I have been troubled with a state of mind that can only be called "dream states" with any degree of truth, although there is a nightmarish quality about them that leaves them not far short of being "real life nightmares". But I am beginning at the wrong end.
>
> At odd times, sometimes repeatedly throughout the day, at other times occurring days apart, my waking mind is submerged by that part of the mind which is active during dreams. So much so that the surroundings and people in the vicinity are presented as they would be if I were dreaming. As though everything going on around me was being presented to me out of the locked recesses of the mind, and with an out-of-the-place familiarity that is very like a strip of film belonging to a known show, being glued by mistake into an unknown reel and presented for one's beholding.
>
> There is no set of circumstances, that is, as far as I have been able to figure out, sufficiently like the circumstances reigning at the onset of any previous attack of this strange malady, that could be conceivably responsible for a further attack or occurrence through their existence at the onset of any subsequent attack. I mention this because it may be of interest, but also because it is the only clear line of thought I can take. I can distinctly remember the beginning, but cannot remember the end nor what happens immediately afterwards. Printed words are outlandish and quite unintelligible for a minute or so, though I am quite sure I am giving them their representative sounds correctly. And just as printed words slowly become sensible symbols again, so do people and their speech. But I cannot remember afterwards what was wrong with the printed words nor what was wrong with the speech of people around during the brief recovery period. Nor can I remember when the scent and taste ceased to interest me during the attack. Looking through these notes I find I have not mentioned this scent before, and that is strange, as this scent is often the first sign I have that things are not as they should be.
>
> I am sitting listening to a conversation when suddenly I notice a familiar scent and realize that the phrases being used are the same ones I have heard dozens of times before. I look up and know at once that I am living a scene that I have dreamed in its every particular. Every expression and gesture as it is made is a realization of my expectation and every movement was inevitable before it began. The faces of those around me have subtly changed so as to be terribly familiar and are no longer individuals but merely part of a scene that I have known from time immemorial.
>
> This scent is very intriguing because of its familiarity and pleasantness and indefinability. I know the scent perfectly well, and in spite of that I am dashed if I can place it. It is always accompanied by a taste of the same nature. Thinking it over I think it must be the same thing. I can smell it and taste it, too. Sometimes there is just this scent and taste together with a vague sense of unreality. But usually I have hardly begun to notice it before I am suddenly in a dream world where well-known figures are gesticulating and doing things that are only important in dreams and where everything is just as it should be and very familiar through my being part of it for donkeys' ages.
>
> The only horrible part of it is that I am conscious through it all and just waiting for it to work itself out, and that I am not helpless I know, for I have often got off the road and waited for it to pass. And on the occasion of the last severe attack, I was fifty feet from the ground clinging to the trunk of a coconut palm where I had climbed to erect an aerial. It was a severe attack and lasted a long time I think. But I hung on through it in spite of the fact that one arm went to sleep and I only had one to hang on with. The only thing I fear is that people notice I go "funny".

The clinical picture may be completed in a few words. In addition to the above subjective symptoms the patient had been complaining of headache of considerable and increasing severity. There was a doubtful impairment of sense of smell on the left side. On the right it was normal. The optic disks were clear. Lower left facial weakness was present, most noticeable in emotional expression. No objective weakness was found in the left upper limb, which had been affected in his most recent attack. The nervous system was otherwise normal. X-ray examination of the skull revealed no abnormality. The blood failed to react to the Kline test.

The patient was evacuated to a neurosurgical centre for further investigation, with a tentative diagnosis of right temporal lobe lesion.

Acknowledgement.

This report is published with the approval of the Director-General of Medical Services.

Reviews.

PRACTICAL ANÆSTHESIA.

J. ROSS MACKENZIE'S small book on practical anæsthesia deserves careful attention by all anæsthetists, and surgeons, too, since it deals in a brief and clear fashion with most of the considerations which a comprehensive survey of modern anæsthesia demands.[1] If anything; however, its brevity is its chief defect, since it results in an imperfect examination and elucidation of many controversial points. Nevertheless, the book maintains a general standard of excellence, even if an impression of idealism and of undue facility is sometimes conveyed. Perhaps it would have been better if the author had dealt thoroughly with four standard methods, say the use of chloroform, of ether, of "Pentothal" and spinal

[1] "Practical Anæsthetics: For Students, Hospital Residents and Practitioners", by J. Ross Mackenzie, M.D., D.A. (R.C.P. and S. England), with a foreword by W. C. Wilson, M.B., Ch.B., F.R.C.S.E.; 1944. London: Baillière, Tindall and Cox. 8″ × 5¼″, pp. 144, with illustrations. Price: 10s. 6d.

anæsthesia, instead of trying to cover all the ground, much of which properly belongs to the specialist.

The opening passages on the assessment and preparation of patients for anæsthesia could hardly be bettered, and the humane and considerate attitude evident there is maintained throughout. At times, perhaps, the presentation resembles a mere catalogue of alternative methods, inadequately discussed and explained, but in general a good basis for action in varying circumstances is offered. The book is clearly printed and well illustrated, and apart from some obscurity due to bad punctuation on pages 44 and 119, contains few typographical errors. There are, however, several crudities of style, notably the references to "vagi nerves" on pages 24 and 26, and the mention of the "increase of carbon dioxide in the blood gases" on page 81. The use of "cerebrum" instead of "cranium" in the description of a head harness on page 110 is an obvious mistake, and the same applies to the remarks on stagnant anoxia on page 83 wherein peripheral vascular failure should replace "cardiac failure". There is no doubt, too, that the respective proprietors would view askance the author's reference to "novocaine tabloids".

Many statements in the book invite criticism; these are in the main trivial, but are sometimes essential in significance. Of trivialities, Moot's formula is now certainly discredited; an apparent glycosuria is often due to drugs like chloral given the night before anæsthesia is induced; the great advantage of the lateral posture is that it frees the airway; repeated assertions that the epiglottis may become impacted in the glottis are not convincing; and 3,000 cubic centimetres would seem the correct volume for the alveolar air. Again, ether is not a heavy liquid, and unless contaminated does not burn the skin; the giving of only thirty drops in the first two minutes would be intolerable dalliance; Shipway's warming device is absurdly inefficient; and the giving of oil and ether by the rectum is a messy procedure. Further, the real reason for intubation with cyclopropane is the likelihood of laryngospasm; anæsthesia induced by the endotracheal method will not produce complete relaxation with a minimum of anæsthetic agent, especially when a tracheal cuff is employed; undue use of "controlled respiration" impairs venous return and so cardiac output; hypocapnia, with impaired dissociation of oxyhæmoglobin, is prevented by the inevitable dead space of almost all apparatus; the routine cocainization of the larynx is of dubious merit; and in blind intubation the chin must be supported, so as to lift the epiglottis away from the posterior pharyngeal wall. Moreover, the use of atropine is generally desirable before "Pentothal" is given; "Pentothal" is not often a suitable preliminary to tracheal intubation; the necessity for a clear airway with "Pentothal" is absolute; diabetics do very well under "Pentothal", and the concurrent use of sulphonamides is not contraindicated. Yet again, 2% "Novocain" solution is useless for topical application; a clear distinction between "Nupercaine" 1 in 200 and "Nupercaine" 1 in 200 with 6% glucose is necessary; immediate posturing for an optimum distribution of the drug is required in spinal analgesia; and the syringes *et cetera* used should be boiled in fresh distilled water beforehand. Finally, a single unadvertised injection of "Avertin" is far superior to repeated saline enemata before thyreoidectomy; caudal block for cystoscopy is farcical with "Pentothal" available; the fact that nitrous oxide supports combustion should be stressed; and air should be used instead of nitrous oxide and oxygen as a vehicle for ether given by the insufflation method.

Essential objection must be made against the author's fanciful interpretation of the "law of diminishing resistance", for which the progressive saturation of the patient's tissues with the anæsthetic is an adequate explanation. While vagotonia may produce cardiac arrest, that it may cause ventricular fibrillation is highly improbable, this being rather a manifestation of sympathetic hyperactivity. As regards nitrous oxide and oxygen, the author's account implies a facility and satisfaction not commonly attainable. The likelihood and dangers of oxygen want are not sufficiently emphasized, and the necessity for giving an excess of oxygen when ether or other adjuvants are used is largely ignored. He displays ambiguity in the discussion of its use for infants and children, in that his initial commendation is at variance with the disadvantages subsequently recognized. The supreme importance of the dead space factor in apparatus used for children receives inadequate attention, and thus the real reason for the success of Ayre's T-tube is overlooked. However, the use of basal narcosis for children is admirably discussed, and the advice given could well be applied more widely in this country.

It is strange that, after several references to the advantages of controlled respiration in various circumstances, the author should advocate the use of continuous positive pressure anæsthesia in cardio-omentopexy. It is well known that intermittent positive pressure—that is, controlled respiration—is of much value, whereas the other greatly hinders the respiratory exchanges. The frequent recommendation of vinyl ether as an adjuvant to the gaseous anæsthetic agents is also questionable, in that either its prolonged administration or concurrent oxygen want is likely to involve the risk of liver necrosis.

From the foregoing it should not be concluded that this little book is full of inaccuracies. It is, on the contrary, a veritable mine of information from which much that is of value may be obtained. The final notes on medico-legal considerations are highly apposite and deserving of careful appreciation by all concerned.

CARE OF THE MOTHER DURING PREGNANCY AND AFTER DELIVERY.

"ANTENATAL AND POSTNATAL CARE", by F. J. Browne, holds an assured place in the literature of British obstetrics. The author has again thoroughly revised the book and has produced the fifth edition.[1]

A new chapter has been added, "The Rh Factor and Erythroblastosis", containing a useful summary of the practical importance of this new subject. The chapter on radiology in obstetrics has been revised by J. Chassar Moir. This presents a clear outline of a subject of growing importance, one too often neglected by general practitioners, either through ignorance of its value or from lack of facilities for its use. An account has been given of the recent work on diet in pregnancy, especially on its possible effect in preventing various diseases and accidents of pregnancy.

The chapter on heredity is unsatisfactory. The theoretical discussion of the laws of heredity (including Mendel's peas in a monastery garden) would be more suitably dealt with in other volumes. The clinical details could then be transferred to other chapters in the book: firstly, to the section dealing with the explanation given to the patient at her visits during pregnancy, and secondly to the discussion of the diseases of the various body systems in pregnancy. The part devoted to care of the mother after delivery looks a little like an appendix to the work, consisting of only thirteen out of 622 pages. The author is certainly in a difficulty here, as in order to increase his material he must discuss the conduct of the puerperium or enter the field of gynæcology. The volume might be more useful if more of both subjects were included.

Our midwifery patients tell us that we do not take enough interest in them; the community thinks that we have become dominated by the curative rather than the preventive emphasis in medicine; our medical teachers hold that the maternal and fœtal mortality and morbidity are still too high. This book should help to remove these charges, because it is invaluable to those engaged in the practice of obstetrics.

MIDWIFERY FOR NURSES.

"MIDWIFERY FOR NURSES", by Aleck W. Bourne, has reached a third edition.[2] As well as undertaking a general revision of the book, the author tells us that he has paid more attention to nutrition, physical exercises and the psychological factors in midwifery. The wartime paper restrictions have limited the scope of the revision.

The book contains a useful account of the knowledge required by a midwifery nurse. We think that more space could be given to treatment, for, although a nurse will not be required to carry it all out in full, yet she must have some idea of what the doctor is going to do.

One of the most useful chapters in the book is a short one on "Delay in Labour", in which the author focuses attention from the clinical point of view on the commonest problem in obstetrics. In any later editions it might be useful to have similar chapters dealing with other difficulties in diagnosis, judgement and treatment.

[1] "Antenatal and Postnatal Care", by Francis J. Browne, M.D. (Aberdeen), D.Sc., F.R.C.S. (Edinburgh), F.R.C.O.G.; Fifth Edition; 1944. London: J. and A. Churchill Limited. 8" × 5½", pp. 630, with many illustrations. Price: 24s.

[2] "Midwifery for Nurses", by Aleck W. Bourne, M.A., M.B., B.Ch. (Cambridge), F.R.C.S. (England), F.R.C.O.G.; Third Edition; 1944. London: J. and A. Churchill Limited. 8" × 5", pp. 304, with illustrations. Price: 7s. 6d.

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A QUEENSLAND INQUIRY ON SEXUAL OFFENCES.

IN all discussions on crime and criminals two aspects of the subject must always be kept in mind. One is the protection of society against the malignity of the criminal; the other has to do with the treatment that has to be meted out to the guilty person. In regard to the latter it has been held in these pages that the role of medicine is to be the evangelist of the better doctrine, the doctrine of rehabilitation and the recovery of self-respect. But medicine has an interest in both aspects of the subject and this is particularly true in relation to sexual offences. Sexual offences call for special consideration because, in addition to the serious and far-reaching effects that they may have on the body of the person against whom they are committed, they are likely, especially when children are concerned, to produce a profound and lasting psychological trauma. It is difficult for many reasons to obtain any idea of the number of sexual offences committed in a community, but some idea of the relationship of sexual to other offences may be gathered from W. Norwood East's book on the adolescent criminal. East recorded that of 4,000 lads, whose ages were between sixteen and twenty years, and who were convicted of offences, 125 had been convicted of sexual offences. (See THE MEDICAL JOURNAL OF AUSTRALIA, October 17, 1942, page 361.) During a war sexual offences become more numerous, and those communities are fortunate which have legislation that will cover most of the conditions that arise. That community also is wise which inquires into the prevalence of these offences and into its ability to deal adequately with them and then takes steps to act on the findings. For this reason notice must be taken of a report recently presented to the Attorney-General of Queensland by the Committee of Inquiry Regarding Sexual Offences appointed at Brisbane by the Governor-in-Council on March 2, 1944.

The committee comprised the following: Mr. Justice Neil Macrossan (chairman); Dr. Phyllis D. Cilento; Dr. L. P. Winterbotham; Dr. J. M. Thomson, Chief Medical Officer for Prisons; Dr. B. F. R. Stafford, Director of Mental Hygiene; Mr. G. A. Cameron, Chief Police Magistrate; Mr. J. F. Whitney, Comptroller-General of Prisons; Mr. A. Jessen, Inspector of the Criminal Investigation Branch. The terms of reference of the committee included inquiry into the following:

1. The prevalence within Queensland of all classes of offences defined in sections 210, 212, 214, 215, 216 and 219 of chapter 22 and sections 348 to 352 inclusive of chapter 32 of "The Criminal Code".
2. The extent (if any) to which there has been, within the past ten years, an increase in any, and, if so, in which of the said classes of offences.
3. The extent (if any) to which any of the said classes of offences is the result of mental perversion or abnormality or mental sickness.
4. The causes which have, during the past ten years, led to an increase (if any) in any and which of the said classes of offences, and the measures (if any) which can be taken to remove such causes.
5. The increase, in each of the said ten years, of each class of offences in proportion to any increase in population in each such year.
6. The adequacy of the punishment prescribed by "The Criminal Code" for such offences.
7. The further or other measures (if any) which should be taken by law to deal with persons convicted of an offence of any of the aforesaid classes, and the desirableness of dealing with any such convicted person by segregation and/or by physical, mental, surgical, or other treatment, and the circumstances and manner in which and the extent to which such segregation and/or treatment should be applied.
8. The steps, if any, which should be taken to ensure protection to any persons or classes of persons against the commission of any of the said offences and to ensure that they may not tempt or be tempted to commit any of the said offences.
9. Any other matter in the premises, upon which it may appear desirable to the committee or to any member thereof to report.

The offences covered by the report include the following: indecent dealing with boys under fourteen years of age; unlawful carnal knowledge of girls under twelve years of age and attempts to have such carnal knowledge; attempts to have carnal knowledge of girls under ten years of age; unlawful carnal knowledge of girls under seventeen years of age and attempts to have such knowledge; indecent dealing with girls under seventeen years of age; abduction of girls under eighteen years of age with intent to have carnal knowledge; rape; attempt to commit rape; indecent assault on females; abduction with intent to marry or carnally know or from motives of gain; abduction of girls under sixteen years of age. The number of offences reported in Queensland during the last ten years are set out under these headings, and it is clear that in nearly all groups an increase has taken place during the war years. The numbers given are not regarded as accurate for two reasons. One is that parents are often reluctant to bring upon themselves and their children the publicity unavoidably associated with the preferring of criminal charges of the kind in question of which their children have been victims, and object to the children being witnesses in courts of law in regard to them. The second reason is that many offenders are dealt with summarily under other sections of the Criminal Code for what are in fact sexual assaults. In some instances owing to difficulty of proof admission of guilt of a less serious offence has been accepted and the more serious charge has been dropped. It cannot, of course, be assumed that in every case in which a charge has been made, an offence has actually been committed. This is particularly true of

rape. "It is not unknown for such charges to be made by a female who has consented to the illicit sexual relations of which she complains later." In regard to some of these matters the committee makes important recommendations; they are so reasonable that their adoption would alone justify all the time and trouble taken in the preparation of the committee's whole report. The psychological trauma inflicted on a child by a sexual assault is enormous and in many cases well nigh ineradicable. Anything that can be done to expunge the happenings from the child's memory should be done, and this will not be possible if the child has to tell the story again and again in evidence in a public place like a police court. The committee points out that when the child concerned is a necessary and competent witness, it will first of all be examined before justices at the preliminary hearing of the charge and later, perhaps after an interval of months, will be subjected again to the ordeal of examination and cross-examination before a jury. The committee recommends that the provisions of the relevant act should be extended so that the depositions of a child, taken before justices in regard to an indictable sexual offence committed on the child or on some other child, might be read as evidence at the trial on indictment of the person charged, at the discretion of the judge of the trial. It is held that this should operate in respect of children of not more than twelve years of age and that two further conditions should be fulfilled—these have to do with the taking of the depositions before justices and the presence of the accused with opportunities of cross-examination when the depositions are taken. The adoption of this recommendation, it is held, would merely extend certain provisions already existing under the act—it would not mean the introduction of any new principle. This recommendation has to do with the welfare of the victim of a sexual offence. Efforts to cure the criminal of his morbid tendencies may call for entirely different measures, but before that aspect of the subject is discussed some mention should be made of the committee's views on the conditions that lead to sexual delinquency.

On the evidence at its disposal the committee is unable to reach any conclusion about the extent to which these offences may be the result of mental perversion or abnormality or mental sickness. In the State of Queensland there is no provision for the systematic examination of persons charged with or convicted of sexual offences for the purpose of determining their mental status. "Unless the mental condition of a person charged is so grossly abnormal that he is certified to be insane or mentally sick, no assessment of his mental condition is made or recorded, and in general the only material available for the purpose of determining it is an opinion of a police officer on the matter which may have been recorded." That such a state of affairs should obtain in a State that is so advanced in other respects, is as remarkable as it is to be deplored. War conditions are held to be responsible for the recent increase in sexual offences; but even though lack of parental control of children and adolescents and inadequacy of sleeping accommodation for families are thought to be partly caused by war conditions, the committee does not appear to attach much ætiological significance to them. It is a pity that the committee is not definite about this aspect. Opinions differ greatly today about parental control and how it should be exercised. The parent-child relationship cannot be discussed at present, but it may be stated that in many cases parental control of children would be impossible since the parents themselves in such cases are lacking in stability and strength of character. The committee does not consider that economic conditions as a whole have made any great contribution to the increase in sexual crime. This does not mean that they have no basal significance. Similarly no evidence was forthcoming to show that alcohol was a real contributing cause; on the other hand addiction to alcohol, where it existed, was thought merely to accompany a tendency to commit sexual crime. "Addiction to alcohol and proneness to sexual crime are evidentiary of a defective personality." The committee believes that cinematograph films which over-emphasize the sexual side of life or which give a spurious glamour to irregular sex relations, are a contributing factor in the lowering of the standards of behaviour in the relations between the sexes, particularly adolescents. It makes a plea for the stricter censorship of films and of the sale of pornographic literature. All medical observers will not agree that the average cinematograph film is likely to be harmful to the average adolescent, and will hold with some justification that films questioned by adults of experience are generally passed unheeded by modern youths who often surprise the observant by their common sense and discrimination. With regard to adolescents of lesser mentality there will be grounds for argument. It would appear that the committee attaches some importance to the standards adopted by a large section of the community, for with seeming irrelevance it refers to the increase of venereal disease among women and attributes it mainly to promiscuous intercourse by women who are not under any economic stress to indulge in such intercourse. "In the opinion of the committee, the fundamental cause of this state of affairs is the deterioration of moral standards and the rejection by a large portion of the community of any moral basis for conduct and of any duty of self-control or self-discipline in sexual relations."

The aspects of this report that remain to be considered are those that deal with punishment and with the prevention of offences and treatment of offenders. These may appropriately be considered together, because punishment should be directed at the recovery of the delinquent from his delinquency. The committee thinks that the punishments prescribed by the Criminal Code are inadequate in respect to certain types of offence. These cannot be discussed at length. To the medical mind they are much less important than measures operating on the preventive side. Reference must, however, be made to the contention that a person who is unable to exercise proper control over his sexual instincts, particularly when his abnormality is manifested in assaults or indecent dealings with children, should be under some form of permanent restraint while his condition persists. Everyone will agree that the infliction of a fine for such offences (this apparently has happened when the offence has been dealt with summarily) is quite inadequate. There is something in the committee's contention that to inflict a fine can almost be regarded as in the same category as the exaction of a licence fee for the indulgence of sexual depravity. The committee also holds that when persons convicted of sexual offences are discharged upon recognisance conditioned to appear and receive judge-

ment when called on, or when sentence is suspended upon recognisance conditioned that they shall be of good behaviour for a period, they should be subjected to the direction of qualified probation officers. Enactments under English law are quoted as models adaptable to local conditions in this regard. Interesting detail is given on the questions of prevention and treatment, and about certain of the views on prevention some difference of opinion may well be expressed. Those whose interests lie in this field of sociological medicine will have to study the report for themselves. At the same time it is appropriate to refer to a study that has lately been published by Dr. Lewis J. Doshay, psychiatrist of the Children's Courts, New York City, on the boy sex offender and his later career.[1] The study which illuminates the subject under discussion covers 256 juvenile sexual cases and the boys ranged in age from seven to sixteen years when they were studied between June, 1928, and June, 1934. At the present time they are anywhere from sixteen to twenty-eight years of age and thus present "a fair cross section of the stage of life when criminal tendencies fully manifest themselves". The boys were divided into two groups—a "primary" and a "mixed" group. Those in the primary group had, as far as was known, been involved in no offensive behaviour other than sexual; there were 108 in this group. The remaining 148 boys, those in the "mixed" group, were known to have engaged in offences such as stealing, burglary, desertion of home, ungovernableness and truancy in addition to the sexual offences; they were boys of the general delinquent type. The interesting point about the boys in the primary group was that open investigation in court or in a psychiatric clinic brought about a cure. Only eight of the 148 boys were guilty of a second offence, and these were only minor affairs. Doshay points out that when the offence is brought into the open and properly investigated "the latent forces of shame and guilt, inherent in the moral-cultural pattern, are properly stimulated into action". In other words conscience comes into play. He goes on to state that "powerful self-generating barriers against recidivism are laid down in the personality, which effectively and lastingly resist a return to sexual offenses". But in the "mixed" group sexual offences were not self-curing. In this group, instead of internal shame and guilt, the dominant forces operating are those that operate in general delinquency: internal hate and external fear, defiance and anxiety for self-defence. We can thus understand that "court- and clinic-treated juvenile sexual offenders are probably not the source of the dangerous sex criminals that disturb society from time to time". Doshay adds that adult sex criminals of the violent type may come from among sex offenders who failed to obtain the benefits of court and clinic treatment, as in cases "where juvenile sex offenders remain undetected, where parents hush known sex events through fear of family embarrassment, or where treatment is rendered haphazardly and ineffectively". This statement presumably refers to Doshay's primary group; his mixed group would be certain to yield adult sex offenders. For the boys of the mixed group Doshay advocates placement in homes of relatives, in boarding schools and in institutions, and this brings us again to the Queensland committee's report and its advocacy of institutional treatment. The committee believes that an offender's susceptibility to treatment can be determined only by expert physical, psychiatric and psychological examination. If special legislation is needed for this to be done, there should be no delay about its enactment. There is in Queensland no institution which provides for the complete care of persons who are mentally deficient but not certifiably mentally ill. Provisions for the establishment of such an institution and also for one for criminal backward persons are contained in *The Backward Persons Act of* 1938, and there is no doubt that these provisions should be brought into operation without further delay. The operations of the Borstal system in England are so well known that they merely have to be mentioned, and there is scope in all the Australian States for work on modern lines in the prevention of crime among adolescents. Other States are ahead of Queensland in this matter, and it is hoped that the presentation to the Attorney-General of this report on sexual offences will be followed by some action. To consign it to the repository of forgotten things, to keep company with the provisions of *The Backward Persons Act of* 1938 that have been mentioned, would be a disaster.

[1] "The Boy Sex Offender and his Later Career", by L. J. Doshay, M.D., Ph.D., with a foreword by G. W. Henry, M.D.; 1943. New York: Grune and Stratton. 8½" × 5¾"; pp. 217.

Current Comment.

THE SERUM SALICYLATE CONTENT IN ACUTE RHEUMATISM.

In the treatment of acute rheumatism it has become customary to prescribe fairly large doses of sodium bicarbonate with sodium salicylate with the object of limiting some of the salicylate's unpleasant effects. In this regard Katharine Smull, René Wégrid and Jessica Leland have made some interesting observations.[1] While conducting a study of the use of massive doses of salicylate in rheumatic fever they noted that the serum salicylate content of one of their patients fell considerably when he was given sodium bicarbonate to relieve gastric distress. This fall occurred although the dosage of salicylate was the same and the level of salicylate in the blood previously had been practically constant. They accordingly investigated the influence of sodium bicarbonate on the serum salicylate content of four adults suffering from acute rheumatism and of two healthy adults. Sodium salicylate was given in a dose of 7·2 grammes to 10·0 grammes per day in the form of enteric-coated tablets. When the serum salicylate content had arrived at a fairly constant level, sodium bicarbonate was given in an equal dose. After a few days the administration of bicarbonate was suspended while the administration of salicylate was continued. In each case the salicylate level in the blood fell rapidly on the administration of bicarbonate and rose just as rapidly when the administration of bicarbonate was discontinued. When bicarbonate was given with salicylate from the commencement, the serum salicylate content failed to rise to the level that it otherwise would have reached; but it rose rapidly when the administration of bicarbonate was stopped. To determine whether the presence of bicarbonate vitiated the test for salicylate, bicarbonate was added to serum *in vitro*. The same result was obtained whether bicarbonate was present or not. The effect of bicarbonate may be interference with the absorption of salicylate or "increase of extracellular fluid which leads to a decrease in the titer of sodium salicylate in the blood" or increased renal excretion of sodium salicylate or its derivatives. The lesson seems to be that sodium salicylate should be administered in the form of enteric-coated tablets without bicarbonate. In this way the desired effect will be obtained with a lower dosage.

[1] *The Journal of the American Medical Association*, August 26, 1944.

Abstracts from Medical Literature.

BACTERIOLOGY AND IMMUNOLOGY.

Chronic Meningococcus Carriers.

C. P. MILLER, W. G. BEADENKOPF, D. PECK AND M. W. ROBBINS (*The Journal of Infectious Diseases*, May-June, 1944) have made a survey of chronic meningococcus carriers in a semi-permanent population in a part of the University of Chicago, and in a group of selected out-patients in the oto-laryngology section of a hospital. A simple curved wire swab was found satisfactory for taking post-nasal samples, and these were inoculated onto freshly poured blood agar plates. The agar was prepared from a tryptic digest of meat, contained corn starch and dextrose, and was buffered to pH 7·4. Rabbit or sheep blood was used; 2,360 cultures were made, and 82 isolations of meningococci were obtained. Typing sera prepared in rabbits and chickens were used. The carrier rate rose in the winter months, and figures as high as 17% among groups tested were recorded. Sixteen strains were type 1, 26 were type 2 and seven type 4. Twelve strains could not be classified. Repeat cultures were not always obtained, but when they were, the same type was always isolated. Sixty-one carrier strains were tested for virulence, the mucin method of preparation being used; of eleven type 1 strains, none were fully virulent, five were moderately virulent, and six non-virulent, while of type 2 twelve strains were fully virulent and only two non-virulent. No instance was found of a husband and wife harbouring the same organism, so that invasiveness did not appear to be a feature. Meningococcal meningitis was beginning to be more prevalent in the city when the survey was closed. Agglutinins for their homologous strains were demonstrated in three-quarters of the sera tested from these carriers.

Vibrio Choleræ from 1942 Kunming Epidemic.

F. F. TANG, C. M. CHU AND Y. W. WONG (*Indian Journal of Medical Research*, May, 1944) have made a study of *Vibrio choleræ* isolated from the 1942 Kunming epidemic, with special reference to serological types. One hundred and twenty-nine rectal swabs were collected, placed in alkaline peptone water and subcultured onto alkaline agar and a further tube of peptone water. They were examined after incubation and identified. Motility tests were done, the cholera red reaction was sought, and the liquefaction of gelatine and tests for hæmolysin production were performed. Serological tests were applied in two ways. A stock serum was diluted one in twenty and slide agglutination was sought, and two special "O" sera were prepared from cultures isolated first in Japan and supposed to be serologically distinct. Falling dilution tube tests were performed with each of these. Sixty-four of the cultures agglutinated to titre with "O" serum, called Inaba, and only five with the other, called Ogawa, and it was noted that these appeared late in the epidemic. In the study on the clinical side, forty-four attempts at culture from 54 specimens taken in the first week of the disease were successful, and only four of sixteen in the second week. Of the patients, 1% were thought to have had some form of preventive inoculation. The mortality in the series was 30%.

Detection of Pyrogens in Fluids.

B. C. BOSE AND M. L. AHUJA (*Indian Journal of Medical Research*, May, 1944) have discussed the detection of pyrogens in fluids by biological methods. Hyperpyrexia in rabbits may be unreliable if the animals are not accustomed to being handled, as handling may alone cause considerable temperature variation. Rectal temperatures should be taken while the animal is fasting, and the thermometer should be introduced to a constant distance of three-quarters of an inch beyond the anal ring. One hundred rabbits were tested for four hours daily, and a maximum normal variation of 0·6° F. was established. Tests for the presence of pyrogens were then carried out on solutions prepared with distilled water and reservoir water, and normal saline solutions in amounts corresponding to one cubic centimetre per 100 grammes of body weight were given intravenously to groups of five rabbits. It was found that the distilled water saline solution gave only slightly increased variations over the maximum normal variation, while that prepared from reservoir water gave variations of over 2° F. Two organisms were isolated from this reservoir water, and proved to be responsible for the production of the fever in rabbits. Experiments were carried out parallel with these to find out if the leucocyte variation under these conditions might be a quicker and reliable method of testing for the presence of pyrogens, but it was found totally unreliable, as the required fall of 4,000 leucocytes per cubic millimetre was never observed. The authors believe that the temperature records carefully taken were a satisfactory method of determining the presence of pyrogens in fluids.

Transmission of Hæmolytic Streptococci.

MORTON HAMBURGER, JUNIOR (*The Journal of Infectious Diseases*, July-August, 1944), has studied cross infection in army hospital wards as the first step in a series of studies on the transmission of hæmolytic streptococcus infections for the Commission on Air-Borne Infections, United States Army. In a series of wards set aside for the isolation of common respiratory diseases, scarlet fever, rubella and rubeola, the author determined that while in some wards where a 50% carrier rate of hæmolytic streptococci existed, cross infection did not take place; in other wards the presence of two or three people harbouring group A streptococci was responsible for very rapid spread. The German measles patients showed a high susceptibility to infection when carriers were present. Typing of streptococci was necessary to determine details of spread, as some cases due to other types might develop in the presence of a known carrier of another type.

MORTON HAMBURGER (*ibidem*) has further studied hæmolytic streptococci in the saliva of persons with positive throat cultures, selecting scarlet fever and tonsillitis patients. They were given paraffin to chew, saliva was collected, diluted in broth, and plated on mule blood agar containing one part in 500,000 of gentian violet. The counts made on dilutions of saliva of 10^{-3} and 10^{-3} could not be relied on; 10^{-4} was the best dilution; some false negatives may have been recorded. However, it was shown that heavily infected throat cultures were more frequently associated with positive saliva cultures (68%), and less heavily infected throat cultures with a smaller percentage of saliva cultures (41%). When organisms were typed, the same type were found in throat and saliva. Seventy-two patients had received sulphonamides at some time while their saliva was being studied, and little or no effect was observed on the bacterial population of saliva containing as much as 9·4 milligrammes *per centum* of sulphonamide. Patients whose tonsils had been removed had fewer organisms in the saliva than patients with normal throats, and carried the streptococci for shorter periods.

MORTON HAMBURGER, JUNIOR, THEODORE J. PECK, VIRGINIA G. HAMBURGER AND MARGARET A. JOHNSTON (*ibidem*) have continued with studies of hæmolytic streptococci in air, floor dust and bed-clothing of hospital wards and their relation to cross infection. Air sampling by suction through broth of calculated quantities of air and "settling plates" exposed for a given time were used. Sweepings from 28 square feet of floor space were collected, and bed-clothing was tested by beating and sampling the adjacent air, and by a small suction apparatus of vacuum type. The cultures from the air showed a rough agreement with the cross infections occurring in the ward from which the samples were taken, though the presence of group A streptococci was not necessarily associated with cross infection. That cross infection did occur was illustrated by the worker attending the sampling machine. At one period of the study she was working on an enclosed porch where three scarlet fever patients were. She contracted a sore throat owing to the type present in the heavily infected patient and showed no streptococci of the types present in the two convalescent patients. The infected bed-clothing appeared to be an important reservoir of hæmolytic streptococci, as samples of air taken fifteen minutes after a blanket was beaten contain hundreds of colonies of hæmolytic streptococci, and some patients appear to contaminate their bed-clothes much more heavily than others. The authors suggest rigid criteria for the term "air-borne infection", and believe that its control is to be effected largely by control of secondary reservoirs in dust and bed-linen, which fortunately afford good scope for such work.

Experimental Arthritis in the Chick.

G. JOHN BUDDINGH (*The Journal of Experimental Medicine*, July, 1944) has studied experimental *Streptobacillus moniliformis* arthritis in the chick embryo. The test organism was isolated from the blood and joint fluid of a patient with rat-bite fever. A small drop of culture fluid was inoculated into the chorio-allantoic cavity of twelve and fourteen day chick embryos,

and all were infected, the younger embryos dying at forty-eight hours, the older surviving to seventy-two hours. Lesions of joints were prominent, inflammatory exudate collecting in the joint cavity and synovial membrane being markedly swollen, while large numbers of organisms were present. Some evidence of localization of bacteria in the liver was found, and one embryo had an ulceration of the myocardium. The organisms appear to have a facultative parasitic intracellular selection of the cytoplasm of the synovial cells. The infection appears to be self-limiting in character.

Jaundice and Vaccination against Yellow Fever.

W. A. SAWYER, K. F. MEYER, M. D. EATON, J. H. BAUER, PERSIS PUTNAM AND F. F. SCHWENTKER (*American Journal of Hygiene*, July, 1944), in parts 2, 3 and 4 of the report on jaundice in army personnel in the western region of the United States of America, and its relation to vaccination against yellow fever, state that the jaundice was similar to catarrhal jaundice, and that its development followed the use of certain batches of yellow fever vaccine given from 60 to 150 days earlier than the appearance of the jaundice. One thousand two hundred and eighty-four cases were studied, and the mortality was 3%. No definite instance of secondary infection was found. It was thought that the association of human serum with the modified yellow fever virus in the vaccine was the most plausible hypothesis to explain the manner in which the icterogenic agent had been introduced into the mixture before use. It was also thought that the agent was most probably a filterable virus capable of causing disease, and circulating in the blood, giving rise to a prolonged carrier state so that well donors of blood to a blood bank could transmit the agent. Numerous attempts to isolate the virus failed. The team of investigators has recommended that all existing lots of vaccine be suspended from use, and that only serum-free yellow fever vaccine be utilized for the immunization of military personnel against yellow fever. Finally it has added a note of warning that while the risk of transmitting an icterogenic agent by vaccination with a mixture containing human serum has been eliminated, the use of serum or plasma in other ways may still be dangerous, and therefore all encouragement and assistance should be given to research aimed at isolating a causative agent from patients suffering from post-inoculation jaundice.

HYGIENE.

Epidemic Kerato-Conjunctivitis.

J. G. MOLNER AND E. COOPER (*American Journal of Public Health*, June, 1944) state that in Detroit epidemic kerato-conjunctivitis has been common in industrial plants and a high percentage of workers develop opacities. In eye clinics the chief method of spread is from eye to eye by way of instruments. Detroit decided to make the condition reportable. Each eye clinic set up a strict and complete aseptic technique, gowns and rubber gloves, sterilized equipment *et cetera* being used. The patient was not allowed to touch anything. Acute signs, congestion and lachrymation were followed by a lay off notice, and communicable disease nurses visited the plants. Before these measures in a small plant employing 120 persons 16 became infected by the disease in six weeks. Nine persons of the 16 showed corneal opacities. In six months 247 had the disease out of 1,096 seen. For treatment dark glasses with a small absorbent pad below the eye gave comfort. Tyrothricin in a thirty milligramme *per centum* solution gave good results, reducing the time for recovery.

R. F. CORNS, M. SAUNDERS AND R. C. ALEXANDER (*ibidem*) report that in an epidemic of kerato-conjunctivitis, serum from patients and contacts was mixed with tenfold diluted virus of kerato-conjunctivitis incubated one hour at 37° C. and after storage in the ice box for twenty-four hours injected into Swiss mice. Control mice all died with all tested dilutions through 10^{-6}. Test sera with titre 10^{-4} or less gave significant results. Attendants on the sick, though unaffected, showed high titres of neutralizing antibody in their blood. Similar findings have been noted in equine encephalomyelitis. The possible existence of asymptomatic carriers suggests a subclinical phase of the disease. Conjunctival scrapings from acutely affected eyes caused only transient symptoms in mice. Into 100 of these mice graded doses of a virus were injected; injections were also given to 100 control mice. The control mice all died from dilution 10^{-6}, whereas the tested mice survived till a dilution of 10^{-3} was given.

Sterilization of Air.

STUART MUDD (*American Journal of Public Health*, June, 1944) remarks that in the United States disease of the respiratory tract was at its highest early in 1943, and even in 1942 the loss of person-days was equal to a loss of the time of 470,000 persons working for a year of 300 working days (one-third of the total days lost). The loss in wages is computed at 900 million dollars yearly. Infection is spread by droplet nuclei atomized into the air, and continuous disinfection of the air of enclosed spaces should be used. Radiation from ultra-violet lamps is now applied in hospital wards, schools and nurseries. One such lamp unit emitting a radiant flux of thirty microwatts per square centimetre at one metre protected two scarlet fever cubicles. This requires an air exposure of over 167 seconds. Dust-laden air adds to the difficulty. Hexyl-resorcinol in propylene glycol is favoured in Britain. Hypochlorite spraying is also successful. Low relative humidity or high organic content makes sterilization difficult. Sterilization is used against influenza virus.

A Fly-Borne Bacillary Dysentery Epidemic.

DWIGHT M. KUHNS AND THEODORE G. ANDERSON (*American Journal of Public Health*, July, 1944) report a fly-borne epidemic of dysentery in a large military unit. The unit came into bivouac in a southern camp. Straddle-trench latrines were in use with free access of flies. Water, ice and milk were fully controlled. In about two weeks dysentery, not severe in type, began to appear. Flies were now everywhere in pest proportions and messes were inadequately protected. Sanitary measures were strictly enforced with marked fly reduction, followed soon after by a similar reduction of infections. In one unit transferred from the area infections ceased to occur after forty-eight hours. Altogether 1,557 cases of clinical dysentery occurred; 383 were bacteriologically positive, and in 91% of these *Shigella paradysenteriæ* Boyd 88 was present. A rectal swab was taken from all who had had dysentery, from all who were food handlers, and also from one entire company. Of the convalescents, 12·8% still gave positive findings after twenty-eight days. Of 443 food handlers, 10·8% gave positive findings. In the entire company (143) 32 had had diarrhœa; 28% of these gave positive findings and 21% of the rest. A large series (292) of flies, fifteen in each lot, were collected, five from messes, four from latrines. They were *Musca domestica*. Nine lots yielded *Shigella paradysenteriæ*. None came from those breeding in closed latrines. After sulphaguanidine (112) and also sulphaxudine (132) no carriers developed, whilst in a series of sixty controls a percentage of carriers existed.

Methyl Bromide Poisoning.

R. N. DEJONG (*The Journal of the American Medical Association*, July 8, 1944) discusses methyl bromide poisoning. This colourless, odourless gas CH_3Br has been much used recently as a refrigerant, a fumigant, a delousing agent, and an insecticide, capable of protecting a variety of foods, drinks, plants, grains and textiles. It is a stable gas, 3·3 times as heavy as air. It is more toxic than methyl chloride, ethyl bromide or ethyl chloride. In animals pulmonary congestion and œdema, excitability, tremors, unsteadiness, convulsions and paralysis have been observed to be caused by it. Similar nervous symptoms have been recorded in man. Three cases are reported. One youth, aged seventeen years, a canner of the gas, suffered from vertigo, paræsthesiæ and difficulty in walking. The clinical signs were not very significant, but he recovered after a few weeks' rest. A second man, aged twenty-six years, had been employed distilling methyl bromide for some months. He suffered from weakness of the legs, giddiness, nausea and vomiting and numbness and tingling of the limbs. Romberg's sign was present. Recovery followed two months' rest. A third man who worked in the manufacture of the gas had similar symptoms. As the gas is to be used by the armed forces, and is now used for civilian purposes, it is necessary that its toxicity should be appreciated. Preventive measures suggested are avoidance of breathing the gas or of spillage, thorough ventilation of cars, rooms or buildings after fumigation, use of a gas mask or positive pressure hose when exposure is necessary, removal of impregnated clothing, care in storage.

British Medical Association News.

MEDICO-POLITICAL.

The Prosecution of Dr. C. J. Simpson.

AT the meeting of the Federal Council of the British Medical Association in Australia of May 30 and 31 and June 1, 1944, reference was made to the prosecution of Dr. C. J. Simpson, of Bright, Victoria, on a charge of having made a misleading statement in an application for tires for his motor-car. It was explained that Dr. Simpson had applied for new tires in September, 1943. The state of the tires on the motor-car at that time was such that they were not likely to last very long, and the garage proprietor who serviced Dr. Simpson's cars had agreed that new tires were necessary. In order to keep his car on the road and to give efficient service to his patients it was necessary that Dr. Simpson should have motor tires that would not fail him suddenly. It was resolved that a formal request should be made to the Attorney-General for the remission of the fine. The following letter received from the Attorney-General's Department is published at the request of the General Secretary of the Federal Council.

[COPY.]

COMMONWEALTH OF AUSTRALIA.

Attorney-General's Department,
Canberra, A.C.T., 2nd November, 1944.

Dear Sir,

I refer to your letter dated 19th June, 1944, addressed to the Attorney-General, in which representations are made for remission of the fine of ten pounds (£10) imposed upon Dr. C. J. Simpson, of Bright, Victoria, in respect of a contravention of the Control of Rubber (Distribution of Motor Tyres and Tubes) Order.

I have now to inform you that the matter has been submitted to His Excellency the Acting Governor-General, who has been pleased to remit the fine imposed, namely, ten pounds (£10).

The Secretary to the Law Department, Melbourne, has been informed of His Excellency's decision and will take the necessary action to give effect to its terms.

Yours faithfully,

(Signed) GEO. KNOWLES,
Secretary.

Dr. J. G. Hunter,
General Secretary,
Federal Council of the B.M.A. in Australia,
135 Macquarie Street,
Sydney, N.S.W.

Mileage Allowance to Medical Practitioners Attending Members of the Military Forces.

The following letter in reply to a letter of protest to the Minister for the Army from the Federal Council regarding the mileage allowance paid to medical practitioners attending members of the armed forces, is published at the request of the General Secretary of the Federal Council.

[COPY.]

COMMONWEALTH OF AUSTRALIA.

Minister for the Army,
25th October, 1944.

Dear Mr. Hunter,

With further reference to your letter of 19th June, 1944, concerning your Council's protest regarding the mileage allowance paid to medical practitioners attending members of the military forces, I desire to inform you that approval has now been given for the payment of the following mileage rates to medical practitioners attending military patients:

Country.—Two miles, free; beyond two miles (one way only), 8 a.m. to 8 p.m., at the rate of 5s. per mile; 8 p.m. to 8 a.m., at the rate of 7s. 6d. per mile.

Metropolitan.—Two miles, free; beyond two miles (one way only), 8 a.m. to 8 p.m., at the rate of 3s. 6d. per mile; 8 p.m. to 8 a.m., at the rate of 5s. per mile.

If transport is provided by or on behalf of the patient, provision is made for payment of an allowance of 10s. 6d. per half hour in respect of travelling time in lieu of the mileage rates.

These increased rates are to be effective on and from 4th October, 1944, and action is now being taken to have the necessary amendments made to the relative regulations.

Yours sincerely,

(Signed) F. M. FORDE,
Minister for the Army.

J. G. Hunter, Esq.,
General Secretary,
Federal Council of the B.M.A. in Australia,
135 Macquarie Street,
Sydney, N.S.W.

National Emergency Measures.

MEDICAL EQUIPMENT.

THE following statement on medical equipment has been received from the chairman of the Medical Equipment and Control Committee.

Although, broadly speaking, stocks of the majority of items of medical equipment are adequate, there are a few which are difficult to obtain. For example, the production of certain goods manufactured from rubber in overseas countries is limited by the stock position of the raw material.

It is necessary, therefore, that there should be an understanding on our part of these difficulties and a determination to refrain from making importunate and ill-timed demands overseas.

It seems advisable, in this connexion, to publish the following extract from a letter received from an Australian official in the United Kingdom.

> Rubber is in very short supply and is a continual headache. The Services are being repeatedly reminded of the necessity to conserve tyres on account of rubber shortage, and the same appeal is made to civilians by notices in the papers, posters and slogans on hoardings. Surgeons are operating wherever possible without rubber gloves and even the homely sock suspender has been altered in design to save rubber. Before the war, for eighteenpence or a couple of shillings, you could get a pair of these suspenders, the basis of which was a strip of rubberised material 12″ long by 1½″ broad with a rubber stud on a rubber tag to facilitate attachment to the sock. At the same time, a hook and eye attachment made it easy to fix the suspender in position after the sock had been put on. The present suspender still has the band to go round the calf, but only 3″ of it are elastic with a breadth of 1″; the rest of the band is made up of some heavy linen-like material. The sock attachment is very trumpery and consists of an eye in which is threaded, with some difficulty, a fabric disc held in position by a piece of thin cotton material. There is no hook and eye attachment, so that you have to attach the suspender to the sock before you put the lot on and drag your suspender over your foot followed by the sock. This leads to waste of time, a certain amount of discomfort and some profanity. This new very inferior article costs 3s. to 3s. 6d. This illustration is given to show the efforts made to conserve rubber to the detriment of the temper and finger nails of the purchaser.
>
> Under these conditions you can imagine, therefore, when recently a local representative of an Australian firm asked for support of an application from Australia for a good many thousand yards of 2″-3″ rubberised webbing, the end use of which was stated, unofficially, to be waist belts for suspensory bandages for Australian athletes, that he received a very cold reception.
>
> I have no doubt that you are experiencing somewhat similar, or even worse, conditions in Australia, and do not blame the Australian manufacturer for making the effort to get what he wants. The case is merely mentioned for fear it should come up as another instance where "Australia House" is obstructive and non-co-operative. You can also realise why we place such reliance on Medical Equipment Control Committee sponsoring. If we have such sponsorship we know that we can go full steam ahead.
>
> A difficulty is that we all are ignorant of one another's shortage, especially as these change from time to time. Some raw material may be short in England but in good supply in Australia. The Australian firms find it hard,

therefore, to understand why they cannot get from England goods made from such raw material. Where there is a world shortage the position is much easier to understand, as both sides of the world feel the pinch and can understand the other man's point of view and realise the joint difficulty. In a word, we are both in the same bed.

We suffer here, as you must do, too, from the fact that raw material is swung about to meet urgent needs; such urgent needs may arise from *new* demands or from *increased* demands. Your call for Sulphanilamide illustrates both these aspects. Lactose is a case in point here. In the early days it was used as a binder for Atebrin tablets, but was replaced in part by starch and now Kaolin, to the detriment of the non-friability of the tablet. Now Penicillin calls for large amounts of lactose and consideration is being given to reducing the lactose content in certain baby foods to meet this new demand.

One could write pages on this theme, and these points are mentioned merely to keep you up to date with how matters are going here, though I feel you know the position only too well. This understanding knowledge on your side is a great help to us here.

Medical practitioners who may be tempted to grumble overmuch at the lack of certain items of medical equipment made from rubber should remember that the shortage is world wide and that excessive demands for the unattainable only lead to misunderstandings overseas.

Correspondence.

"ENGLISH AS SHE IS WRIT."

SIR: In my student days in the early nineties of last century the calendar of the University of Sydney was defaced by the following question set by our portly lecturer in medicine in a final medicine paper: "What are the causes, symptoms and treatment of gastric ulcer of the stomach?" The evil that men do lives after them. A few months ago a professor of pathology in another State wrote in our journal of a man who had "hæmoptysis of blood". And still more recently a high ranking naval medical officer records in the journal that he found "a rash on the malleoli of both ankles".

Yours, etc.,

"SENEX."

November 25, 1944.

Obituary.

JOHN LOCKHART GIBSON.

DR. JOHN LOCKHART GIBSON, whose death was recorded in these pages a few weeks ago, was a man whose name will always stand high in the annals of Australian medicine. He had an influence that extended far beyond the confines of his chosen specialty, ophthalmology, into the general world of medicine, and he held an honoured place in Queensland, where he spent practically the whole of his professional life. His work with Dr. Jefferis Turner on ocular plumbism many years ago was of the first importance and showed the keenness of his mind as well as his tenacity. He stood for all that was good in medicine and his influence throughout the Commonwealth was extended by his attendance at medical congresses where his forcefulness always left its mark. From 1917 to 1944, when he retired because of ill health, he was a member of the Australasian Medical Publishing Company, Limited, and did what he could to further the interests of this journal. His friends in Brisbane have written of his life and work. They refer to him as a scientific observer, as a talented doctor and as a man. That he could understand and sympathize with his fellow man is shown by the affection with which he was regarded by the members of the Returned Soldiers and Sailors' Imperial League of Australia, who presented him with the gold badge of life membership—the highest honour which the league could pay him. Among his published papers were the following.

"On the 'Invisible Blood Corpuscle' of Norris", *The Journal of Anatomy and Physiology*, Volume XVIII, 1884.

"The Blood-Forming Organs and Blood-Formation: An Experimental Research", *The Journal of Anatomy and Physiology*, Volume XX, 1886.

"Notes on a Case of Pernicious Anæmia", read at the Intercolonial Medical Congress, Sydney, 1892.

"Notes on the Occurrence of Anchylostomum Duodenale in Queensland", read at the Intercolonial Medical Congress, Sydney, 1892.

"Diseases of the Eye: Notes on the Practical Use of the Direct Method for Estimating Refractive Anomalies", read at the Intercolonial Medical Congress, Sydney, 1892.

"Notes on Adenoid Vegetations in the Nasopharynx, with Special Reference to Forms of Deafness Connected with their Presence", read at the Intercolonial Medical Congress, Sydney, 1892.

"Case of Herpes Zoster", *The Australasian Medical Gazette*, 1895.

"Two Cases of Maize Corn in the Lower Air Passages", *The Australasian Medical Gazette*, 1895.

"Traumatic Rupture of Carotid into Cavernous Sinus", *The Australasian Medical Gazette*, 1896.

"Peculiar Nasal Polypus in Child Aged 7 Years", *The Australasian Medical Gazette*, 1896.

"Some General Medical Aspects of Nasal Obstruction", Dunedin, 1896.

"Progress Report of a Myxœdematous Sporadic Cretin", Dunedin, 1896.

"Peculiar Binocular Lamellar Cataract", *The Australasian Medical Gazette*, 1898.

"Acute Inflammatory Glaucoma Induced by Dengue", *The Australasian Medical Gazette*, 1898.

"Two Cases of Contrasting Effusion into the Middle Ear and into Labyrinth", *The Australasian Medical Gazette*, 1899.

"Interstitial Keratitis", *The Australasian Medical Gazette*, 1900.

"Useful Hearing Obtained in a Deaf Mute Aged 19", *The Australasian Medical Gazette*, 1900.

"Hemianopsia, with Reference to the Localisation of Cerebral Disease", *The Australasian Medical Gazette*, 1901.

"Earache", *Intercolonial Medical Journal of Australasia*, April 20, 1907.

"Notes on the Use of the Giant Magnet", THE MEDICAL JOURNAL OF AUSTRALIA, December 29, 1917.

"Pulsating Exophthalmos due to Rupture of Carotid in Cavernous Sinus", THE MEDICAL JOURNAL OF AUSTRALIA, September 7, 1918.

"Two Cases of Siderosis", THE MEDICAL JOURNAL OF AUSTRALIA, September 7, 1918.

"On the Importance of De-Ionization in the Treatment of Plumbism in Queensland Children", THE MEDICAL JOURNAL OF AUSTRALIA, April 5, 1919.

"Hernia of the Vitreous into the Anterior Chamber", *The Medical Press*, September 29, 1920.

"Clinical Dangers Introduced by the Wassermann Reaction and the Use of Salvarsan", Supplement to THE MEDICAL JOURNAL OF AUSTRALIA, May 24, 1924.

"Sympathetic Ophthalmia", Supplement to THE MEDICAL JOURNAL OF AUSTRALIA, May 24, 1924.

Lister Centenary Oration, THE MEDICAL JOURNAL OF AUSTRALIA, June 11, 1927.

"Ocular Plumbism in Children", *The British Journal of Ophthalmology*, November, 1931.

DR. JEFFERIS TURNER writes: Australia has lost one of the oldest and best known members of our profession. As a friend of his for the last fifty-five years, I feel it my duty to attempt to give, to the best of my ability, a short account of the man and his career.

John Lockhart Gibson was born eighty-four years ago in Ipswich, Queensland. He was educated at the Ipswich Grammar School. He went to Edinburgh for his medical training, and there had a brilliant career; so much so, that when Rutherford, the professor of physiology, was prevented by illness from delivering his course of lectures, Gibson was selected to fill his place. After completing his Edinburgh course, he studied medical specialties in Vienna, Berlin and London. In London he might have obtained a professorship in physiology in one of the medical schools, but the attraction of his homeland was too strong. He returned to Queensland and commenced practice in Brisbane.

Brisbane was then a small city, and its medical practitioners of that time with one exception (Bancroft) are now almost forgotten. Their fame was local. Queensland then and long after had no university or medical school such as

existed in the larger capitals of New South Wales, Victoria and South Australia. It had some capable practitioners, who were not quite a happy family, and the most of them did not at all recognize the superiority of this raw young man from Scotland. With few exceptions they resented his assumption of greater scientific knowledge. Gibson, on his part, was not one to suffer fools gladly, and no doubt made this evident. The path for him was made difficult.

Notwithstanding, before long he was engaged in a large family practice. This and his work at the newly established Hospital for Sick Children were too much for him. His health broke down, and for eighteen months he was laid low by a serious illness. On his return to Brisbane he relinquished general practice, and confined his work to specialties. Later he restricted it to ophthalmology, for which he had been fully trained, and found in it abundant scope for his abilities.

Anyone who knew Gibson personally could not fail to recognize that, in addition to ability, he possessed character. His ideals were high, and his standards unbending. In morals he recognized, it seemed, only black and white; to the many intermediate shades of grey he appeared to be blind. He was a good friend, but in his younger years at least an uncompromising opponent; and never became hail-fellow-well-met with everybody. This, of course, made him unpopular in local medical circles. In his later years he somewhat mellowed.

In 1915 he offered his services to the army, and was in charge of the ophthalmological department at Mudros, where he remained until the hospital was evacuated. Returning to Brisbane, much of his time was devoted to the ophthalmic care of repatriated soldiers, and this he continued until a few months back, long after he had retired from all other practice.

Of Gibson's achievements in his specialty I am not qualified to speak; but I consider his work in the prevention of lead poisoning among young children, which forty or fifty years ago caused more crippling in Queensland than has ever resulted from infantile paralysis, the most important. Even more dramatic was his discovery that the prompt use of spinal puncture prevented the blindness which often followed the cerebral form of plumbism.

Outside his profession Gibson had many interests, for which he worked hard. Among them were the University, the Medical School, his church, the Brisbane Grammar School, and many others. He was a regular attendant at medical congresses, and was probably even more highly esteemed in other States than in Queensland.

He has left a widow, whose devoted nursing soothed his last long and painful illness, a married daughter and two sons, one of whom is walking in his father's footsteps as an ophthalmologist, and many friends. We shall not look upon his like again.

SIR DAVID HARDIE writes: It has been for over fifty years my privilege to claim the friendship of Dr. Lockhart Gibson. True, we sometimes had our differences. Throughout this long period not once was he actuated by any but the highest principles to which he persistently adhered. An ignoble thought was foreign to his character.

DR. E. O. MARKS writes: With the passing of John Lockhart Gibson went one of the few remaining medicos who made up the Wickham Terrace scene of my boyhood, the nineties. He for a time lived and later had his consulting rooms in the house next door, though we children did not see much of him except through the fence. There was one very notable event when Dr. Gibson caught and held until the police arrived a burglar who afterwards proved to be no less than a police sergeant who had taken to burgling in his spare time. At that time there was a mulberry tree in the Gibsons' backyard and none in ours, though we had silkworms. On one occasion our supply of leaves was disorganized and we were over the fence with no little anxiety at the trespass and the burgling of the mulberry leaves, when Dr. Gibson arrived. To our surprise he was not even cross and told us to take all the leaves we wanted.

When on return from the last war the writer commenced practice in eye work he could not have found a better friend than Dr. Gibson, who helped him in every way he could, even to relinquishing his appointment on the Hospital for Sick Children to make it available for a younger man. Always were his wisdom and experience readily available whenever sought in difficult cases.

At that time there were still occurring many of those cases of ocular plumbism of which the diagnosis is an example of clinical acumen ever to be associated with Dr. Gibson's name. To his vigorous propaganda about the danger of lead paint can also be attributed the recent comparative rarity of the condition.

He was on the Senate of the University when the proposal was made to relinquish as a future home the Victoria Park site previously granted by the Government close to the hospital in favour of the St. Lucia area so generously offered by Dr. Mayne. Foreseeing that the Medical School, when established, would probably be the largest school in the University, and knowing that the hospital work is the most important part of a medical student's life, he realized that a move to St. Lucia would separate the Medical School very largely from its proper community with the rest of the university life as well as be inconvenient for medical students while resident in the colleges. Dr. Gibson put up a strenuous if losing fight to retain the Victoria Park site, which would have been so much better suited to the medical

students as well as more central for day students and, being higher, cooler for work in the summer. The greater advantages for sport, especially on the river, seemed to have more weight with the learned Senate than the educational facilities and St. Lucia was decided on. That the Medical School building has already been erected near the hospital and is in use before the University has been able to move into its new home at St. Lucia four or five miles away, is sufficient comment now.

Born at Ipswich of Scottish parents and educated at Edinburgh University, Dr. Gibson was one of those Scots who hold and express decided opinions and stick to them, and who are nearly always right—a circumstance which does not soothe those who were not seeing eye to eye with him. But he was a great fighter for all that he thought right and took an active part in many public concerns as well as in purely medical ones. His generosity, especially to returned service men, was unabating. He continued to see patients until his last illness prevented him from doing so, and he died in harness while president of the Ophthalmological Society of Australia. Long shall we miss the familiar figure with the brisk walk, helmet and little crooked cane.

DR. G. P. DIXON writes: Whilst a resident medical officer at the Children's Hospital, it was my privilege to be associated in a very small way with the classical work of Lockhart Gibson and Jefferis Turner on lead poisoning in children. The importance of that splendid piece of work did not receive its due appreciation from the medical profession or the public until many years had elapsed. These years showed plainly Dr. Gibson's dogged persistence in the

pursuit of scientific truth, and the fighting qualities of his character which were very noticeable right to the end of his long and busy life.

One remembers his stubborn uphill, but eventually successful, fight against the vested interests involved in the dangerous use of lead paint in Queensland.

Another instance of his fighting ability was the routing of some lesser lights who tried to belittle his achievements and acknowledged position in his special sphere of knowledge. This occurred soon after his return from overseas. His detractors were apparently unaware of two things: (i) that Gibson had an uncanny faculty of being usually right in his observations and deductions and (ii) that he was a born fighter, with the result that they soon dropped out of the fight. This skirmish was the cause of great glee and amusement to the majority of medical men in Brisbane.

During the days of my residency was laid the foundation of my admiration and affection for Dr. John Lockhart Gibson.

Later I had the honour of being admitted to the circle of his friends, an honour which I shared with many of the big names in all ranks of our professional and social life, and of which I am justly proud.

During our long friendship, his sterling worth and lovable qualities became more and more apparent. He was a scientific thinker, a sound physiologist and physician, and a real helper of anyone in distress.

Always an optimist, he hated lukewarmness and defeatism in any form and said so in very definite terms. He did grand work for the army in Lemnos and Egypt, and his cheery optimism and energy in the dark days of the Gallipoli campaign and evacuation were an example and inspiration to all ranks. His remark to some of us after the successful evacuation, "A splendid bit of work; it almost reconciles us to not winning the campaign", gained him the affectionate nick-name "the hopeless optimist".

His sympathies were always with the returned soldiers and his professional ability was ever at their service. One is pleased to know that the Returned Soldiers and Sailors' Imperial League of Australia bestowed upon him the honour of life membership of the League for his help to their sick and disabled members.

Dr. Gibson was a good companion. I have many happy memories of after-work gatherings during congresses *et cetera* where discussion was intimate and interesting, and Gibson's remarks were always worth hearing; and there were usually samples of witty Scottish stories which he loved and of which he had a goodly store.

We must sympathize very deeply with his wife and constant life-long companion, and his sons and daughter in their loss; but at least they have the memory of a splendid character and of a life well spent and duty nobly done. His family life must have been a very happy one based on mutual affection and esteem. I know he was intensely gratified when his son, Walter, was able to relieve him of some of the more onerous duties of his work during his later years and then carried on, keeping up the tradition of service which his father considered all-important.

Apart from his professional attainments, Dr. Gibson's outstanding attributes were courage, kindliness and unselfish consideration for others. These qualities were never better shown than during his long, painful illness when his greatest worry was the thought that he might be a trouble and source of mental distress to others.

Vale, a great fighter for truth, a true friend and a very gallant gentleman.

DR. D. GIFFORD CROLL writes: The passing of John Lockhart Gibson removes a great man from our midst. I have known him for over thirty years, and as a young practitioner learned much from observing his methods. Profound in knowledge of his work, he was nevertheless always willing to investigate and experiment. He never deceived himself as so many do in trying a new idea. If it was not good he was the first to recognize the fact, but if he found it right, would hold firmly to his opinion.

His careful and systematic case-taking was an example to us all. I have taken a patient to consult him whom he had not seen for thirty years, and in a few minutes he had her notes before him. For the poorest child in the Children's Hospital he took the same full notes and gave the same careful attention as he did for the wealthiest of his private patients. A strong adherent of the honorary system, he made it in his case a good system.

Always interested in medical politics, he was for many years a member of the Council of the Queensland Branch and president in 1908. He was also a member of the Federal Committee of the British Medical Association in Australia, a member of the Senate of the University of Queensland, and a foundation member of the Royal Australasian College of Surgeons.

Whilst keenly interested in politics and all matters affecting the community, he always stoutly maintained that a medical man's first duty was to his profession.

A man of strong and emphatic opinions, he acquired enough enemies to make life interesting, but he made more of deep and lasting friendships.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 233 and 237, of November 23 and 30, 1944.

NAVAL FORCES OF THE COMMONWEALTH.

Permanent Naval Forces of the Commonwealth (Sea-Going Forces).

Termination of Appointment.—The appointment of Surgeon Lieutenant-Commander Kingsley Edric Fenton Dixon Hudson, Emergency List, for temporary service is terminated, dated 20th October, 1944.

Promotion. — Surgeon Lieutenant (Acting Surgeon Lieutenant-Commander) Clive Laurence Statham is promoted to the rank of Surgeon Lieutenant-Commander, dated 23rd July, 1944.

Citizen Naval Forces of the Commonwealth.

Royal Australian Naval Reserve.

Appointments.—Newton Symonds Chalk is appointed Surgeon Lieutenant, dated 18th October, 1944; Keith George Moon is appointed Surgeon Lieutenant (D), dated 24th October, 1944.

ROYAL AUSTRALIAN AIR FORCE.

Citizen Air Force: Medical Branch.

The following medical practitioners are appointed to commissions on probation with the rank of Flight Lieutenant with effect from the dates indicated: Alan Robertson Gilchrist (257701), Ronald Wallace Menzies Gray (287762), Alexander Leslie Anderson (267767), Brian Edward Carroll (267764), William Charles Teesdale Chambers (287461), Percy Harris Cohen (257700), Gordon Manning Golditz (267763), Harris Phillip Greenberg (267761), William Brown Law (277520), Louie Leonard Lewis (267760), Geoffrey Agar Leyland (287460), Robert Alfred Lindsay (267765), William George Taylor (267759), Thomas John Thwaite (267766), 1st September, 1944, John Edward Sheehy (267769), Desmond Laurel Rodgers-Wilson (257702), 1st October, 1944.—(Ex. Min. No. 300—Approved 29th November, 1944.)

The grant of the acting rank of Group Captain to Temporary Wing Commander R. I. Greenham (291188) is terminated upon his ceasing to occupy a Group Captain post with effect from the 20th September, 1944.

The probationary appointments of the following Flight Lieutenants are confirmed with effect from 9th October, 1944: D. B. Duffy (256830), D. B. Pearce (257111), L. L. Marshall (7388), W. B. Stafford (257510), A. Bardsley (257498), J. H. Cloke (257500), G. P. Cromie (257501), H. H. Martin (257505), W. M. C. Keane (257559), J. W. Gardiner (257561), R. A. Duval (267693).

The following Temporary Squadron Leaders are granted the acting rank of Wing Commander whilst occupying Wing Commander posts with effect from 1st October, 1944: G. S. Colvin (261246), H. A. A. Altmann (251766), W. A. Seldon (261220).

Temporary Flight Lieutenant A. B. Bourke (256377) is granted the acting rank of Squadron Leader whilst occupying a Squadron Leader post with effect from 1st October, 1944.

Reserve: Medical Branch.

The following officers are transferred from the Active List with effect from the dates indicated: Temporary Wing Commander P. R. Delamothe (271235), 26th October, 1944, Temporary Squadron Leader J. L. Williams (261894), 16th October, 1944, (Flight Lieutenants) R. A. Duval (267693), 9th October, 1944, E. A. Eddy (255903), 12th October, 1944, J. Deane-Butcher (272117), 27th October, 1944.—(Ex. Min. No. 305.—Approved 29th November, 1944.)

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Rowe, Charles, M.B., 1942 (Univ. Sydney), 78, Murdoch Street, Cremorne.

Christie, Amiel Colin, M.B., B.S., 1942 (Univ. Sydney), Captain A. C. Christie, 3, Mirradong Flats, Kirribilli Avenue, Kirribilli.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

Lazarus, Keith Joseph, M.B., B.S., 1943 (Univ. Sydney), Captain K. J. Lazarus, 9, March Street, Bellevue Hill.

Lee, Ernest William, M.B., B.S., 1941 (Univ. Sydney), Flight Lieutenant E. W. Lee, 10, Northcote Avenue, Killara.

McInerney, James Furlong, M.B., B.S., 1942 (Univ. Sydney), NX146280, Captain J. F. McInerney, R.M.O., 2/43 Infantry Battalion, A.I.F., Australia.

Mackintosh, Glencairn, M.B., 1938 (Univ. Sydney), Squadron Leader G. Mackintosh, Flat 7, "Edgewater", 2, Wulworra Avenue, Cremorne.

McKenzie, Henry Ian, M.B., B.S., 1940 (Univ. Sydney), NX77287, Captain H. I. McKenzie, H.Q. Squadron, 2/6 Australian Armoured Regiment, Australia.

Maloney, Errold Frederick Grant, M.B., B.S., 1939 (Univ. Sydney, 26, Mabel Street, Willoughby.

Mason-Johnson, Jean, M.B., B.S., 1941 (Univ. Sydney), Flight Lieutenant J. Mason-Johnson, 35, Kent Road, Rose Bay.

Mooney, Bede Patrick Francis, M.B., B.S., 1941 (Univ. Sydney), Captain B. P. F. Mooney, "The Ranch", Condobolin.

Napthali, Maxwell Albert, M.B., B.S., 1939 (Univ. Sydney), Captain M. A. Napthali, "V" Flat, "Montague Gardens", 80, Cambridge Street, Stanmore.

Pilcher, Robert Bruce Minter, M.B., B.S., 1939 (Univ. Sydney), NX219, Major R. B. M. Pilcher, 16 Australian Camp Hospital, Ingleburn.

Radeski, Carl, M.B., B.S., 1944 (Univ. Sydney), Royal South Sydney Hospital, Zetland.

Ryan, John Patrick, M.B., B.S., 1940 (Univ. Sydney), NX129617, Captain J. P. Ryan, 2/4 Australian General Hospital, Australia.

Scott-Young, Eileen, M.B., B.S., 1940 (Univ. Sydney), Captain E. Scott-Young, 121, Burns Bay Road, Lane Cove.

Sharp, Frank Lane Ritchie, M.B., B.S., 1940 (Univ. Sydney), 57, Vaucluse Road, Vaucluse.

Skinner, Rellee George, M.B., B.S., 1943 (Univ. Sydney), Chalmers Road and Elwin Street, Strathfield.

Swain, John Phillip, M.B., B.S., 1942 (Univ. Sydney), NX201243, Captain J. P. Swain, 2/5 Australian General Hospital, A.I.F., Australia.

Waddell, James Ronald, M.B., B.S., 1943 (Univ. Sydney), NX203566, Captain J. R. Waddell, "ANGAU", Lae.

Wherrett, Leslie Albert, M.B., B.S., 1942 (Univ. Sydney), NX202318, Captain L. A. Wherrett, 1 Australian Water Ambulance Convoy, R.A.E., Australia.

Williams, Albert Henry, M.B., 1939 (Univ. Sydney), 71, Chatham Street, Hamilton, Newcastle.

The undermentioned has applied for election as a member of the Tasmanian Branch of the British Medical Association.

Stegmann, Frank, M.B., B.S., 1940 (Univ. Melbourne), Captain F. Stegmann, 11, Bifrons Court, Launceston, and Brighton Camp, Tasmania.

Books Received.

"A Manual of the Diseases of the Eye", by Charles H. May, M.D., and the late Claud Worth; Ninth Edition revised by Montague L. Hine, M.D., London, F.R.C.S., England; 1944. London: Baillière, Tindall and Cox. 7¾" × 5¼", pp. 547, with many illustrations, some in colour. Price: 16s.

"Elementary Anatomy and Physiology", by James Whillis, M.D., M.S., F.R.C.S., with a foreword by T. B. Johnston, M.D., Ch.B.; Second Edition; 1944. London: J. and A. Churchill Limited. 9¼" × 6¼", pp. 288, with many illustrations. Price: 15s.

"The Surgery of Abdominal Trauma", by Geoffrey E. Parker, M.B., B.Ch., F.R.C.S. (England), with a foreword by Colonel J. M. Weddell, C.B.E., F.R.C.S.; 1944. London: J. and A. Churchill Limited. 8" × 5¼", pp. 128, with ten illustrations. Price: 10s. 6d.

"The Principles and Practice of Medicine, originally written by Sir William Osler, Bart., M.D., F.R.C.P., F.R.S.: Designed for the Use of Practitioners and Students of Medicine", by Henry A. Christian, A.M., M.D., LL.D., (Hon.) Sc.D., Hon. F.R.C.P. (Can.), F.A.C.P.; Fifteenth Edition; 1944. New York: D. Appleton-Century Company Incorporated. Sydney: Angus and Robertson Limited. 9¼" × 6¼", pp. 1528. Price: 63s.

"The Education of an Australian", by E. H. Burgmann, M.A., Th.Soc.; 1944. Sydney: Angus and Robertson Limited. 8¼" × 5½", pp. 101. Price: 2s. 6d.

"Publishing in Peace and War: With Some Notes on 'The Future of English Books on the Continent after the War' and 'The Status of Books'", by Stanley Unwin; 1944. London: George Allen and Unwin Limited. 7¼" × 5", pp. 40. Price: 6d. net.

Diary for the Month.

DEC. 19.—New South Wales Branch, B.M.A.: Ethics Committee.
DEC. 21.—South Australian Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

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